



A TYPICAL AMERICAN INDUSTRY

A History of the AMERICAN SOFT DRINK INDUSTRY

Bottled Carbonated Beverages

1807 - 1957

By
JOHN J. RILEY

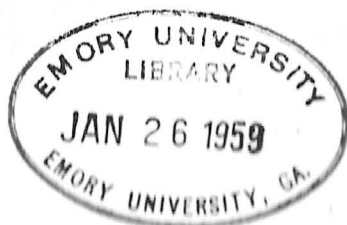


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Introductory

Water is one of the essentials of man's life, and as such has long been the subject of study and experimentation, both as to its characteristics and its uses in the functioning of the human body.

Hippocrates (466-370 B.C.), the "Father of Medicine," related his findings on the contributions of water to better health in his treatise on "Airs, Water, and Places," about 400 B.C. Asclepiades, noted physician of Rome at the time of Pompey (106-48 B.C.), and Antoninus Musa, Greek physician in the service of Augustus (63 B.C.-14 A.D.) the first Roman emperor, had similar interest and studied this important element.

In the early years of the Christian era like attention to the mineral waters of nature was given. Aurelius Cornelius Celsus, Roman philosopher and physician during the first century reigns of Augustus and Tiberius, is mentioned in history as having shown that interest. And the famous Galen (Claudius Galenus, 130-201), who also practiced surgery and physic in Rome in that early period, is similarly listed.

The effervescent feature of many natural mineral waters was, of course, one of their most intriguing characteristics, but it was over 1500 years later before progress in scientific knowledge made possible the more serious studies of that effervescence, including the nature of the gas itself. This then led to interest in simulating the bubbling waters for their beneficial and tasteful qualities,—an interest which is basis of the bottled carbonated beverage industry of the Twentieth Century.

English writers of that later period of development, starting in the 1600's and extending through the closing years of the 1700's, were familiar with the many early treatises on mineral waters. Some said there were more than a thousand in the literature to which their studies necessarily were related. But real progress in an understanding of the natural effervescence and, more important for present purposes, in its simulation by artificial means, came during that later era which encompasses the works of Van Helmont, Boyle, Hoffmann, Venel, Lavoisier, Black, Brownrigg, Cavendish, Bergman, Priestley, and the many others mentioned in the pages which follow.

Carbonated beverages as we know them in America are primarily for the satisfaction of the human need for liquids, and to provide that satisfaction and enjoyment in their consumption which comes

from pleasing taste and aroma. Yet their background must be recognized as having basis in the long search for knowledge regarding that bubbly characteristic which adds so much to pleasure in drinking them.

That, then, is reason justifying the treatment given in this book to the earlier studies of the effervescent factor in the natural mineral waters, in Europe and in America, for it provides a substantial reason for the high status which the industry has acquired.

The bottled soft drink industry in the United States has grown tremendously in the Twentieth Century. Its products are prominent in the list of items commonly identified with the American way of life, as an article of the daily diet. And the rapid expansion of the economy of our country, especially the steady increase in consumers by the millions, are added reasons justifying a high degree of optimism in evaluating the industry's future.

Yet with all of this the way to future advancement requires knowledge as another essential ingredient. Knowledge, in turn, basically is familiarity with the experiences of prior generations. Those precedents provided by the past become vital factors in our solution of current difficulties and in our efforts to forecast the probabilities which lie ahead.

Knowing what has gone on before is therefore some insurance that many pitfalls will be avoided, and that our opportunities may be more readily recognized. Looking ahead is undeniably the fundamental of any plan for progress, but enthusiastic pursuit of that essential is always hazardous without a careful glance into the rear-view mirror before passing others in the line of heavy traffic pushing for the millenium.

It is sincerely hoped that this effort will be a contribution to the continued advancement of the bottled carbonated beverage industry, and help to a better understanding of this typically American business.

* * * *

In any undertaking of the kind presented by this book the sources of information relied upon are varied, and assistance must come from many sources. For much of the information on early European developments in making artificially effervescent mineral waters I wish to give special credit to the early authors whose efforts provided that data.

This has special reference to the two volumes—*The Evolution of Artificial Mineral Waters*, by William Kirkby (Manchester, England; 1902), and *Mineral and Aerated Waters*, by C. Ainsworth Mitchell (London, 1913).

Similar help has come from the more recent materials of George B. Beattie, of Exeter, Devon, England, whose series of articles on "A Brief History of Soft Drinks" appeared in the Soft Drinks Trade

Journal, published in London, during the period February, 1953 to October, 1954. The historical data in Mr. Beattie's articles have been supplemented by extensive correspondence with this author on numerous details relating to the early European industry. His assistance has been most helpful, and is greatly appreciated.

The same aid and encouragement have come from correspondence over many years with Bertel M. Linder, of the Sveriges Vattenfabrikanters Riksförbund, Stockholm, Sweden. Mr. Linder's interest in Bergman's early work on the natural effervescent mineral waters and their simulation has provided a most helpful source of information on that subject.

Other details on the early European activity were provided through correspondence with Dr. George Urdang, Director of the American Institute of the History of Pharmacy, at the University of Wisconsin, and former Director of the Society for the History of Pharmacy, Berlin. The outline of the apothecary trade in the United States and other early history presented in the book *History of Pharmacy* (Philadelphia, 1946), by Dr. Urdang and Dr. Edward Kremers, has been very helpful.

Similar assistance has come from correspondence and materials on early history of chemistry in America provided by Miss Eva V. Armstrong, of the Edgar F. Smith Memorial Collection in the History of Chemistry at the University of Pennsylvania, Philadelphia. And I am indebted to Dr. John F. Fulton and Miss Elizabeth H. Thomson, of the Department of the History of Medicine, Yale University School of Medicine, for materials on Benjamin Silliman.

More specifically relating to origins of the carbonated beverage industry in the United States, the difficulties of a task of this kind would have been multiplied many times without a record such as that provided by the early trade papers prior to the turn of the century, such as the *Carbonated Drinks Quarterly*, the *American Carbonator* and *American Bottler*, and the *National Bottlers' Gazette*.

Special appreciation is extended to the latter. It is obvious to me that William B. Keller, the originator and first Editor of the *National Bottlers' Gazette*, had a thorough appreciation of the value of facts concerning the industry's origins and its development in a fast-moving economy, and did much to preserve that record for posterity in the pages of his magazine. His successors in the N.B.G. editorial chair, the late William B. Keller, Jr., and its current Editor, Morris J. Becker, were most gracious and helpful in making such data available through the many years the materials for this book were being gathered.

My correspondents within the ranks of the industry, in the accumulation of the basic materials for the book, have been innumerable. To all of them I am deeply grateful. I am particularly appreciative of the special efforts extended by Pannill Martin, of the Cloverdale Spring Company, by C. Edgar Hires, of the Charles E.

Hires Company, by Edgar J. Forio and Franklin Garrett, of The Coca-Cola Company, and by Carl J. Palmer, Executive Secretary of the Soda Fountain Manufacturers Association. Suppliers to the industry have been most helpful, and especially E. J. Kohnstamm, of V. & E. Kohnstamm, Inc.; A. W. Noling, of Hurty-Peck & Company; John C. Nowicki, of the George J. Meyer Manufacturing Company; Bert M. Fredericks, of the Liquid Carbonic Corporation; Archie Ladewig, of the Archie Ladewig Company; M. A. Helin, of Infilco, Inc.; Frank A. Selke, of the Pfaudler Company; H. G. Mojonnier, of Mojonnier Brothers Company; William Nekola and Chris C. Dungfelder, of the Barry-Wehmiller Machinery Company; and Dr. Julian H. Toulouse, of Owens-Illinois.

Members of the machinery trades, particularly, have been most cooperative in providing historical details regarding the development and introduction of bottling plant equipment during the Twentieth Century. Special appreciation is expressed for the extended and detailed assistance on that phase given by Frank S. Bell, and the consideration given by Ed. J. Costa, C. L. Day, N. D. Grasty, and Joseph T. Hanlon, his associates at the Crown Cork & Seal Company, in Baltimore.

The preparation and publication of a book of this kind involves a host of details connected with the checking of dates, names, places and other data, typing of the manuscripts, and the retyping of them after revision. These and many other arduous tasks incident to completion of the data for printing were cheerfully accomplished by members of the A.B.C.B. staff in Washington, and for their assistance I express many thanks.

The volume is not presented as a finished history of the industry, but rather as a compilation of source material which exists in no other single, readily accessible place. I am hopeful, therefore, that it will lend encouragement and assistance to others in the years ahead to develop the subject further. With those limitations known, the interest and confidence in its helpful purposes shown by the Officers and Executive Board of the American Bottlers of Carbonated Beverages, in authorizing its publication by the association, are most gratifying.

JOHN J. RILEY

Washington, D. C.

PART I

The Evolution of the American Flavored Soft Drink, and of the Terminology

Evolution of American Soft Drinks

HOW IT STARTED

English writers on carbonated waters have named Thomas Henry as probably the world's first producer of artificial mineral waters for public sale, on a very small scale.

Henry, chemist and apothecary at Manchester, England, was a Fellow of the Royal Society of London, with an active interest in the synthesis of mineral waters and the studies of them by British and Continental scientists, especially as those studies related to medicinal values.

Henry opened his apothecary shop in Manchester in 1764, and presented papers before the Royal College of Physicians in 1771-1773. In them he described his manufacture of "calcined magnesia." It was about this same time, according to the historians, Henry saw the commercial possibilities of Richard Bewley's "Mephitic Julep," and started making it. Although the exact year is rather uncertain, it has to be between 1767-8 (when Bewley first made the medicated water) and 1781 when Henry published a pamphlet describing it.¹

"Mephitic" was one of the early terms applied to carbon dioxide. Henry made this comment on the details of Bewley's "mephitic julep," or medicated carbonated water—"The materia medica perhaps does not afford a more efficacious or more grateful medicine in putrid fevers, scurvy, dysentery, bilious vomitings, hectic, etc."

USE OF SODA

In his pamphlet of 1781, in addition to recipes for "Artificial Pyrmont Water" and "Artificial Seltzer Water," Henry includes directions for preparing the "mephitic julep," being sold by him commercially, as follows:

Dissolve three drams of fossil alkali in each quart of water, and throw in streams of fixed air, till the alkaline taste be destroyed. This julep should not be prepared in too large quantities; and should be kept in bottles very closely corked and sealed. From four ounces of it may be taken at a time, drinking a draught of lemonade, or water acidulated with vinegar, by which means the fixed air will be extricated in the stomach.

Henry is not credited with the origin of artificially carbonated waters, of course. They had long been the subjects of synthesis by

numerous scientists, many of whom will be referred to in the Chapters following. But he has been named as the first to commercialize them in a limited way. It is also of some importance to note Henry's reference to "fossil alkali," which is an old term for soda, and to recognize his recommendation that it be taken in combination with "a draught of lemonade" for the chemical properties he points out. Its flavoring value may have been incidental but its use in that way has some importance as precedent.²

THE NAME "SODA WATER"

The name "Soda Water" does not appear to have been used by Henry in his description of the carbonated waters he made, nor can the year of first use of that term be stated with certainty. It is clear, however, that it was in use during the last decade of the 1700's.

Cavallo, for instance, gave directions for the preparation of an "acidulous soda water" in his publication *"An Essay on the Medicinal Properties of Factitious Airs"* (London, 1798), and he referred to the "soda water" being made and sold by Schweppe.

Incidentally notable in this origin of terminology is a report made to the National Institute of France, in December, 1799, relating to waters synthesized by Nicholas Paul and Company at Paris, in which "hydro-carbonated water" was included along with Seltzer, Spa, gaseous alkaline, Seidlitz, oxygenated waters, and others.

Later, in 1802, a circular advertisement used by Paul in London included the line "The gaseous alkaline water commonly called soda water has long been used in this country to a considerable extent."

The statement that the name "Soda Water" was in general use at the turn of the century is further supported by a published reference in 1799 to A. & R. Thwaites & Company, of Dublin, as "makers of soda water." An advertisement of the firm, dated April 1801, refers to "artificial Mineral Waters such as Soda Water, Seltzer, Cheltenham, Rochelle and Pyrmont."

Even though contemporary evidence is lacking as proof of similar early use of the name "Soda Water" in America, such use may be confidently assumed. With a type of the artificially carbonated waters well known by that name in Europe about 1800, it was only natural that it would appear quickly on this side of the Atlantic. And American scientists were aware of it and did begin using it in reference to the particular species of carbonated water to which it applied.

In the Fulton-Thomson biography of Benjamin Silliman, letters of that noted scientist are quoted. In one letter, dated October 10, 1806 Silliman comments on his need for suitable bottles for the "soda water" he had been called upon to make in New Haven. And, in another dated April 2, 1807, he again complains about his inability to get suitable bottles for the "soda water concern" in which he was engaged. His trouble was summed up in his statement "I cannot procure any glass bottles which will not burst, nor any stone ones which are impervious to the fixed air."



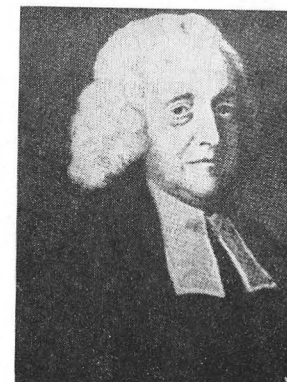
Van Helmont
1577-1644



Robert Boyle
1627-1691



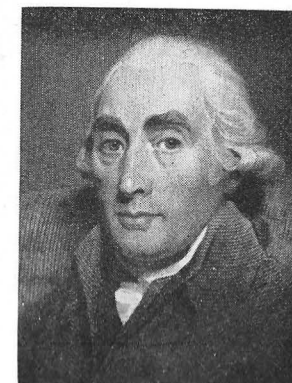
Dr. Friedrich Hoffmann
1660-1742



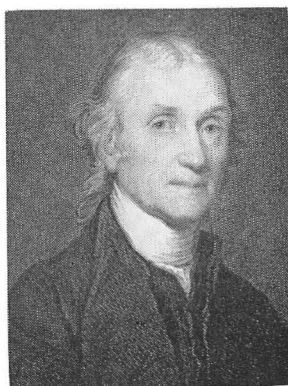
Stephen Hales
1677-1761



Henry Cavendish
1731-1810



Dr. Joseph Black
1728-1799



Joseph Priestley
1763-1804



Torbern Bergman
1735-1784



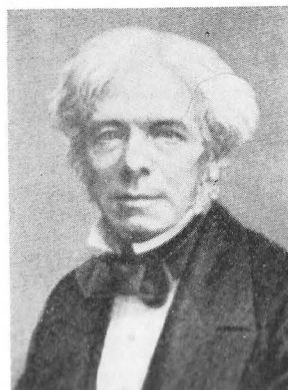
Antoine L. Lavoisier
1743-1794



Antoine F. de Fourcroy
1755-1809



Jons Jacob Berzelius
1779-1848



Michael Faraday
1791-1867

II. EARLY EUROPEAN SCIENTISTS

EVOLUTION OF SOFT DRINKS

5

Introduction of the term into the American scientific literature was equally as early, for in the *Register of the Arts*, published in May, 1808, is found reference to the business newly established in Philadelphia by Joseph Hawkins, of providing artificial mineral waters. Among them, that classified as "Soda Water" is listed. In 1808, also, the *Port Folio* mentioned it in a discussion of the artificial mineral waters made in Europe.

And in the 1809 American edition of Marcet's *Conversations on Chemistry* an Appendix on "Artificial Mineral Waters," credited to Silliman, describes "Soda Water" and refers to its manufacture in New York and Philadelphia, as well as to the public establishment of Silliman in New Haven.

MEDICINAL SODA WATER FIRST

It would thus appear that these early applications of the term "Soda Water" were primarily to a specific type of carbonated water, in which soda was an ingredient for its medicinal properties. During the years prior to about 1830, on both sides of the Atlantic, soda water was but one of the general species of the therapeutic artificial mineral waters, carbonated. They were so described in the pharmacopeias.

In Europe the making and vending of this type of medicinal "Soda Water," by that name, seems to have continued from the experimental period of the late 1700's for a substantial period into the 1800's. In England, prior to the British Pharmacopoeia of 1898 soda water was strictly a medical product and was required to contain sodium bicarbonate. Plain carbonated water was listed in some of the European pharmacopeias as "Aqua acidi carbonici."

In America, the name "Soda Water" early acquired a changed meaning as the product evolved from the medicated water to a flavored refreshment, with that change being recognized in the pharmacopeia and in the field of science.

The Appendix to the *Conversations on Chemistry*, for instance, shows the earlier meaning by the following comment:

The soda water is not an exact imitation of any natural water, but has been directed by medical men as a remedy in a number of common and troublesome complaints. It is ordered in the pharmacopeias and dispensaries, and their prescriptions should be followed in this manufacture. It is a complete remedy against sourness of the stomach, commonly called heartburn, and in most cases of indigestion and weakness of the stomach it is very useful; gradually restoring the appetite, and with it the tone of the organ; it is a preventative, of many of the diseases of the stomach and bowels, which proceed from acidity, and for the same reason it often removes or prevents the sick headache.

As a palliative and even a remedy, in some cases of urinary calculi and gravelly complaints, it is preferable to the Ballstown water. It may prevent, arrest, retard, or remove the complaint according to circumstances.

IN THE U. S. PHARMACOPOEIA

Reference has been made to the pharmacopeia. "Soda Water" was listed among the Medicated Waters included in the first *Pharmacopoeia of the United States*, issued in 1820 (Boston, December, 1820).^a

There the description of its preparation included two ounces of subcarbonate of soda (bicarbonate) to one gallon of water, impregnated with "about ten times its volume of carbonic acid gas, by means of a forcing pump."

Soda Water, as such, was not listed in any issue after the first U. S. Pharmacopoeia. However, "Carbonic Acid Water," being water impregnated with carbon dioxide, but with no soda added, was included among the medicated waters in the first and in all subsequent issues of the decennial revisions of the U. S. Pharmacopoeia, through the fifth revision of 1870.

As to the directions for "Carbonic Acid Water" in the U. S. Pharmacopoeia, two things are of interest. It was only plain water, carbonated, and thus the same product to which the name "Soda Water" has been applied to the present day. The 1820 print also explains it was "Commonly called Seltzer Water." Notable, too, is the fact that in all issues after the 1820 U.S.P., beginning with the 1831 revision, the prescribed carbonation was reduced to five times the bulk of the water, or 5 volumes, which more closely approximates the carbonated waters of the present day.

Pertinent to the foregoing, the lexicographers generally agree that the term "Carbonic Acid Water" is correctly applied to the liquid above referred to. However, they also point out that the term "carbonic acid gas" is incorrect, as a chemical term.

Since early in the Twentieth Century "carbonic gas" has been widely used in the trade as a preferred designation of the gas. Some authorities hold this to be an inaccurate chemical designation, and that "carbon dioxide" makes the technically correct distinction from other gases. Nevertheless, the term "gas carbonum" was one of those used by Van Helmont; "gaz carbonique" appears in the French literature of the mid-1800's, and "carbonic gas" continues in common use in the American industry.

AMERICAN SODA WATER

This disappearance of the medicinal type of "Soda Water," by that name, from the U. S. Pharmacopoeias beginning in 1831, would seem to warrant the assumption that in America the actual use of soda in soda water for medical purposes had largely disappeared by that year. That is indicated by the literature of that period.

Dr. John Bell, in his book *On Baths and Mineral Waters* (Philadelphia, 1831) makes this statement:

Of all mineral waters, the acidulous are those which, by the aid of chemistry, we have been able most successfully to imitate. The leading object has been to impregnate water with carbonic acid to the extent of several volumes of the latter to one of the former. It is this carbonated acidulous water which is sold at all the apothecaries' and most of the confectioners' shops under the name of soda water. This last is a wrong appellation, for although at first it was customary to add a small quantity of soda to the water, at present there is not in general I believe any addition of this kind made.

The same conclusion is presented in the 1831 issue of the *Journal of the Franklin Institute* (Philadelphia, Vol. XII, p. 176).⁴

And in Putnam's *Handbook of the Useful Arts* (New York, 1852) this statement appears in the discussion of "Soda Water":

This common and refreshing beverage is, as usually prepared, a supersaturated solution of carbonic acid gas in water. True, soda water was formerly prepared (and is still by some manufacturers) for medical use, chiefly as a remedy for heartburn, and certain forms of dyspepsia and calculous complaints; and consisted of one, two, or three drachms of carbonate of soda, dissolved in a pint of water highly impregnated with carbonic acid. This is often a valuable remedy; but would sometimes be attended by mischievous results, especially if indulged in to the extent to which some persons pursue the use of soda water. The mere aqueous solution of carbonic acid, which is made by forcing the gas into water by a condensing pump, and under a pressure of six or eight atmospheres, is an agreeable, and generally speaking, harmless diluent.

A somewhat different explanation of the origin of the name "Soda Water" is made by LaWall in *Four Thousand Years of Pharmacy* (Philadelphia, 1927).

Pointing out that the manufacture of carbonated waters on a large scale was begun in Geneva in 1790 by Nicholas Paul, he states "... Later a substitute for the mechanically prepared carbonated waters was introduced in which the aeration was produced by reaction between saleratus (baking soda) and tartaric acid, and the name 'soda water' came into general use. Such a product had slightly laxative properties and was the equivalent of the product made by mixing the component parts of the well known 'sodaic powders.'" He points out that this method of carbonating water was soon discarded and the impregnation of water with the gas under pressure was revived.

Of course, LaWall's explanation was made in the twentieth century, and probably can be explained by the prominence which the "sodaic powder" type of products acquired in the druggist trade at times during the 1800's.

FLAVORED SODA WATER ARRIVES

The transition of soda water from its early medicinal types to a drink primarily for refreshment and enjoyment involved, as a first step, the elimination of the soda. Then flavorings were added. The types of flavored effervescent drinks produced were a novelty, although combinations of plain water with flavors of various sorts had been known and used by man for a long time.

Lemonade as a mixture of lemon juice, water, and sweetening has been known for centuries. In that form it is not to be confused with carbonated beverages in general, or included as one of the species of effervescent drinks. The American product nomenclature, therefore, requires no special consideration of that term, but in a discussion of the European industry's products or origin of flavoring in carbonated drinks it does seem to be involved.

In several of the Continental countries the name "Lemonade," or "Limonade," is used in a generic sense similar to the American use of "Soda Water," or "Carbonated Beverage." In those countries "Limonade" embraces all flavors, and is not restricted to a still lemon drink, as here. Its early European development could be the pre-

cedent, and may offer some explanation for the origin of the flavored soda water Americans have known for over a century.

The Kirkby and Beattie histories of soft drinks in Europe trace the development of lemon juice drinks from ancient times. They give special attention to the popularity of lemonade during the later years of the 1600's, and through the 1700's. Particularly in southern Europe, including France, the commercial aspects of the product included the trade of the "Limonadiers,"—many of whom were itinerant merchants, dispensing the drinks from tanks carried on their backs. In France (1676) they were formed into an association, under government franchise or patent, and known as the "Company of Limonadiers."

Beattie states that this popularity of lemonade, and recognition of the therapeutic and dietary values of citrus juices (but lemon particularly), existed in England for more than a century prior to the experimental period of Black, Brownrigg, Macbride, Cavendish, Priestley and the many others, in the late 1700's. And by Scheele's discovery in 1784 of citric acid, with its known chemical properties, this general fund of knowledge concerning citrus fruit chemistry was materially supplemented.

It is not surprising, therefore, to find the 1781 reference by Thomas Henry to use of lemonade as an accompaniment to Bewley's "Mephitic Julep," previously mentioned, then being prescribed by Henry for various human ills. The Macbride studies published in 1767, and upon which Priestley relied to some degree, anticipated that use of citrus juice. His paper was entitled *Experimental Essays on Medical and Philosophical Subjects*. In it Macbride discussed the mixture of alkaline salts in lime juice or other acid juices, to produce an effervescent drink for treatment of scurvy and yellow fever. Priestley recognized the validity of Macbride's findings, although he attached more importance to the antiseptic properties of the carbonated liquid than to the properties added by citrus juice.

These early English references to the beneficial use of citrus juices with the newly developed artificially carbonated and medicated waters, backed by the long period of European reliance upon "limonade," provided at least some basis for the later use of flavoring in the manufacture of the effervescent drinks, and make such use more of a natural development than a distinct innovation.

OTHER FLAVORING INFLUENCES

To a limited extent commercial manufacture in Europe of the artificial mineral waters, carbonated, followed promptly the period of Priestley and his scientific contemporaries during the later years of the 1700's.

In Britain and on the Continent that early developmental period extended well into the 1800's—variously set at a point between 1820 to 1835.

In America, too, although probably with a somewhat later start, it covered approximately the same period of time. Yet, for all of

those developmental years no conclusive data appears concerning when, how, or by whom the addition of flavoring and sweetening was first made in compounding the flavored carbonated waters.⁵

It seems certain, however, that early attention given in this country to the flavoring, and its use in such wide variety, are reasons why the effervescent soft drink has been considered a refreshment predominantly American in origin and in popularity.

Sweetening was perhaps the first novel flavoring which was used in the artificially carbonated waters, and that was sugar. And then there was the likely influence of the known properties of citrus juices on the early development of flavoring for them, previously mentioned. Yet there were other flavor sources which must have had their effect in the same direction.

Mixture of the carbonated waters with wine, was common in England as early as 1795 for the reason given that "when mixed with wine it is found that a much smaller quantity of wine satisfied the stomach and the palate, than wine does alone."

And this flavoring effect from mixture of soda water or seltzer water with wine was known and practiced in the United States at about the same time. The 1809 American edition of *Conversations on Chemistry*, previously quoted, also includes the following reference:

The Soda Water is also very refreshing, and to most persons a very grateful drink, especially after heat and fatigue, and may be made a complete substitute for the beverages of which ardent spirits form a part. With wine and sugar it is very grateful.

The early reference in the foregoing to sweetening the combination with sugar should be noted.

FLAVORING SYRUPS

Thus the change from imitation of natural mineral waters to the effervescent water, sweetened and flavored, must have been well underway in this country during the earlier years of the 1800's. And by 1830 the use of flavoring syrups for that purpose was sufficiently well established in America to be given recognition in the literature; juices and many other flavorings were being used.

As early as 1830 a discussion of soda and artificial mineral waters in the *Journal of Health* (p. 328, Vol. I), a publication of the Association of Physicians, of Philadelphia, refers to the use of syrups for flavoring the waters. And in the first edition of the *Dispensatory of the United States of America*, authored by Dr. George B. Wood and Dr. Franklin Bache (Philadelphia, 1833), the recipe is given for making syrup of mulberries, with the suggestion that similar syrups could also be prepared from strawberries, raspberries, and pineapples. These syrups "are employed to flavor drinks and are much used as grateful additions to carbonic acid water," the book says. In the first U. S. Pharmacopoeia of 1820, directions for making sarsaparilla syrup were included.

That such use by the apothecaries, in the artificial mineral waters they were making, was growing is shown by the recorded use of fruit

syrops for that purpose at the drug store of Smith and Hodgson, in Philadelphia, about 1835.

And yet it is apparent that that transition was something of a slow process, and that the older types of brewed drinks continued to be popular items for many years. For example, the 1854 edition of *Griffith's Universal Formulary* (Philadelphia), a text for the American apothecary who was even then finding the soda fountain a means of adding to his trade, mentions "Sarsaparilla Syrup for mineral waters"; it also gives recipes for brewing ginger beer, spruce beer, and molasses beer.

As to the variety of the flavorings, one of the earliest available records of the flavorings of that mid-century era is a book by Pierre Lacour, of Bordeaux, France, written in 1853, and published in New York for American use (1868) under the title *The Manufacture of Liquors, Wines, and Cordials; also the Manufacture of Effervescing Beverages and Syrups*.

Flavors used by the soda water maker were listed. It seems clear they were intended primarily for the soda fountain operation, since they included Sarsaparilla, Lemon, Pineapple, Orange, Strawberry, Vanilla, Peach, Grape, Almond (or Orgeat), Spirit of Aromatics (ginger, cloves, sassafras, lemon, bergamot), Spirit of Roses, Blackberry, Mulberry, Raspberry, Neroli (orange, orris-root), and others. Passing mention might be made of his formulas for Syrup of Jasmine, Syrup of Cologne, Syrup of Peach Blossoms, Syrup of Wine, Syrup of Violets, and Syrup of Red Roses—likely the French influence. As possibly related to the evolution of ginger ale, and in addition to ginger beer, he also mentions "Girambing or Limoniated Ginger Beer."

ICE CREAM SODA

As the flavoring of soda water gained popularity at the soda fountains, sweet cream also was added to the flavored drink. Parrish's *Treatise on Pharmacy* of 1874, for example, gives instructions for making "simple syrup of cream," including the statement "Some pharmacists prefer to make syrup of cream, and to flavor these by the addition of strong fruit, and other syrups, in the glass, on drawing the mineral water." Sweet cream is still used in flavored carbonated drinks in some parts of the United States.

The combination of ice cream and soda water, as "Ice Cream Soda," came later, but it no doubt had its origin with the then existing custom of adding sweet cream. According to one version of how it started, a Philadelphian named Robert M. Green, local agent of the New York City firm of John Matthews, manufacturers of soda water apparatus, had installed a small soda fountain at the Semi-Centennial exposition of the Franklin Institute, in Philadelphia, in October, 1874. Drinks were sold, and the demand was greater than Green anticipated, with the result that his supply of sweet cream was depleted. He could not replace it except with vanilla ice cream,

obtained from a nearby confectionery. He planned to let the ice cream melt and then use it as sweet cream. Customers refused to wait, however, and he added the ice cream. The customers preferred the novelty over the old method, so the story goes, and thus the ice cream soda was started.

The foregoing refers to the use of ice cream, as such, in the drink. The term "Ice Cream Soda" preceded Green's innovation, being first used in reference to the mixture of carbonated water, sweet cream, and flavoring. Gustavus D. Dows, of Lowell, Massachusetts, in 1860 advertised the product of his marble fountain as "Iced Cream Soda." In that same period other advertisements referred to "Frigid Cream Soda drawn from Puffer's Superb Fountain." Harper's Monthly Magazine for August, 1872, in an article on "Soda Water" made the statement—"Soda-Water with cream sirups, when well iced as above, has been fancifully named 'ice-cream soda,'" with obvious reference to the type of drinks prepared at the Dows and Puffer fountains, with the sweet cream syrups.

TERMINOLOGY DEVELOPS

With the advent of flavorings for the "Soda Water," and with the background of medical significance of that term, almost inevitably its suitability in America for the new, popular item of refreshment was brought into question. The relatively few alternatives which developed, and none with the same degree of acceptance and use, point to the difficulty of the problem which was presented.

The term "Soda Water" was early objected to by the trade as being inapplicable to a product which contained no "soda." In the *Carbonated Drinks Quarterly* for October, 1877, this was pointed out, and the possibility of using "marble water," "syrup water," or "carbonic acid water" was mentioned, but not favored. The Editor preferred "aerated water," or "carbonated water," with the latter his first choice. Accordingly, he suggested that the term be adopted for ordinary usage in the trade.

Nevertheless, until well into the twentieth century, at least, "Soda Water," or "Soda," was the more common generic designation. Such few others as acquired any preference were quite typical of the American scene.

"Mineral Waters," of course, was the generic term applied to the various types of artificially carbonated waters first in vogue, including soda water, following the early European practice. The classification "Mineral and Soda Waters" was used in the Federal censuses, beginning in 1880, or earlier, and extending through 1900.

The name "Pop," having special reference to flavored soda water in bottles, came into use about midway the nineteenth century. It was used, for example, in the 1861 edition of Vol. III, *A History of American Manufactures for 1608 to 1860* (J. Leander Bishop), in the classification "Mineral Waters and Pop" as heading for data on factories in various cities.

"Pop" came, not from the composition of the product, but rather from the popping noise made when the gaseous pressure within the bottle was released, by removing the cork or other closure. The term has been generally associated with products on which the Hutchinson stopper or similar bottle closures were used, dating from about 1880. Its use has continued with the crown cap, but the bottler's preference for the term "Pop" has declined materially, influenced by his desire to distinguish the quality products of the twentieth century from their early predecessors of the 1800's, when processes and ingredients were comparatively primitive.

Another generic name, among the more prevalent for the bottled effervescent drinks, is "Tonic." Its use has been largely regional, and principally in New England, where it continues to be used to some extent. Quite obviously, the term has some background related to the tonic or health values early attributed to carbonated waters. In England its limited use has a somewhat similar connotation as in the name "Gin and Tonic," the latter term referring to carbonated quinine water.

"CARBONATED BEVERAGE" AND "SOFT DRINK"

With the rapid increase in varieties of drinks offered to the American public, and the tremendous growth of the industry in the 1900's, the importance of emphasizing the carbonation characteristic of the effervescent product to favorably distinguish it from others, has been reason for its manufacturers preferring the term "Carbonated Beverage," especially as to bottled carbonated beverages. This preference may be related as to reason and purpose with limited efforts about 1880 to popularize the name "Carbonade," but which were not successful. "Carbonated Beverages," however, is widely used and accepted in America as the preferred term.

The name "Soft Drink" is that most commonly applied to the general category including all varieties of nonalcoholic liquid refreshment, including both the carbonated and still, and referring to those prepared at fountains, in bottles, and in cans. It has a limited application to the soft drink powders, pills, and syrups which have been entering the American market.

The derivation of the term obviously was to distinguish the simple flavored refreshment from spirits, or hard liquors, for which they were widely recommended as a substitute in the effort to change the imbibing habits so characteristic of earlier days in America. Bottled soda waters (and particularly drinks such as birch beer and Persian mead) were widely referred to and advertised as "temperance drinks" as early as 1878, but that specific connotation has largely fallen into disuse.

PART II

The European Development of Simulated Effervescent Waters During the Early 1800's

2

European Scientific Origins

EARLY STUDIES¹

The bubbly, sparkling, bottled carbonated beverages which are so familiar to all Americans of the twentieth century have an interesting and important scientific background. For centuries man was familiar with the beneficial effervescent waters of the natural springs, and with the known values of those waters it was the desire to make them available to everyone which led to the early studies of the natural phenomenon of effervescence, and to attempts to make similar waters by artifice.

Studies of the natural waters and of their chemical nature were made by many of the early physician-philosophers of Europe, and became a part of the transition from the mysteries of alchemy to the science of medicine. The interest of some was confined to the chemistry of the mineral content of the waters, but many more were intrigued by their effervescent nature and made that the primary object of their inquiries.

Tradition tells us that early in the sixteenth century Paracelsus (1493-1541) made limited observations on the characteristics of the effervescent mineral waters of his native Switzerland, along with the extensive studies for medical treatment of human ills which so closely identify him with early medicine. His contemporary the alchemist Thurneysser (1530-1596), made what is perhaps the earliest attempt to duplicate some of the natural waters, in 1560. And his German critic, the chemist Libavius (1540-1616), made similar studies and experiments, commenting on them in his "De Judico Aquarum Mineralium," of 1597. Other studies were made by DuClos in 1665-1667, and by Hierne in 1680.

ENTER THE PHYSICIAN-SCIENTIST

Dr. Jean Baptiste Van Helmont (1577-1644), the Belgian physician, was the most prominent chemist of the early half of the seventeenth century. He extended the medical studies of Paracelsus, accepting some of the latter's theories, but rejecting others. Van Helmont studied the vapors which characterized the natural springs and their effervescent waters, and was the first to give to their vapors the name "Gas" in his use of the terms "gas carbonum," "gas vinorum," and

"gas musti." Previously it had been called "spiritus silvestris," the wild spirit of the mineral waters.

Later in the same century England's most famous scientist of that age, Robert Boyle (1627-1691), made similar observations on the bubbling waters, with suggestions for their artificial preparation. In 1684 Boyle published his *Short Memoirs for the Natural Experimental History of Mineral Waters*, including references to the imitation of natural mineral waters "by chymical and other artificial wayes." He referred to the gas as "artificial air." The well known "Boyle's Law" on the physics of air was one of the important and direct results of his early experiments in pneumatic chemistry, including the effervescent factor of the mineral waters.

Dr. Friedrich Hoffmann (1660-1742), German contemporary of Boyle, and professor at the University of Halle, included a treatise on mineral waters among the numerous works and papers for which he is historically famous as one of Germany's outstanding physicians, chemists, and teachers of the early 1700's. His collected works were highly esteemed sources of instruction on medicine and chemistry, all during the 18th century.

In 1685 Hoffmann suggested artificial preparation of the waters by mixing of alkali and acid in a bottle having a narrow mouth, with shaking of the vessel to generate the gas and cause its absorption by the liquid. That Hoffmann was dealing in theory only and had not actually been successful in carrying out the process was claimed by later experimenters. Much of the early popularity of the Seidlitz Spring was due to Hoffmann's efforts.

Early in the new century, Dr. Hermann Boerhaave (1668-1738), of Holland, made his studies of the effervescent vapors of the mineral waters, also, extricating the gas from chalk. Boerhaave's treatise on chemistry (1732) was the best the world had seen. Medical historians refer to him as the most celebrated physician since Hippocrates.

There were many others, too, making similar studies, including Scheffer of Sweden, Geoffrey of France, Seip, Chrouet, and Springfield. Dr. Chrouet was perhaps the first to use the term "aerial acid" in his reference to the mysterious effervescence.

DR. JOSEPH BLACK

A little later Dr. Joseph Black (1728-1799), noted Scotch physician, chemist, and professor at the universities of Glasgow and Edinburgh, was prompted by the differing opinions of physicians regarding remedies then used for alleviating the pains of urinary calculi, to investigate the relation of alkalies and the gas which could be obtained from them. Black was able to prove that limestone contained much "air" of a nature which differed from common air and from which, by means of diluted spirits of vitriol, it could be disengaged as a gas. To distinguish it from all other gases, he named it "fixed air," and identified it with the gas of fermentation. This was in 1757.

Dr. Black's studies of the gas are recognized as the first real progress in chemistry of the effervescent factor present in mineral waters. The

University of Edinburgh was one of the European sources of medical education frequently attended by students from colonial America. Dr. Benjamin Rush, of Philadelphia, studied under Dr. Black at Edinburgh.

FRENCH SCIENTISTS

In France, too, the chemistry of the effervescent waters was receiving attention. Dr. Gabriel F. Venel (1723-1775), celebrated physician and professor of medicine at the University of Montpellier, made progress in duplicating the bubbling Selters waters, and demonstrated his method before the French Academy of Science in 1750. He produced a solution which closely resembled the natural Selters—a slightly saline effervescent water. But he confused the gas with air, and called the solution "aerated water," an original use of the term.

Venel, for his experiments, has been given the credit for the first substantial progress in the making of artificially carbonated mineral waters. However, his process resulted in a deposit of the neutral salts, formed by the union of the alkali and acid used in evolving the carbon dioxide, with resulting effect upon the palatability and wholesomeness of the liquid. Nevertheless, many of those who followed used the method of Venel until the more precise and satisfactory methods of Priestley, Lavoisier, Macquer, and de Chaulnes came in later years of the century.

Dr. Pierre Joseph Macquer (1718-1784), physician, chemist and leading French advocate of the phlogiston theory of combustion, collaborated with Lavoisier in the study of the effervescent spirit of the waters and devised means for purifying it after it was generated from alkalies. Macquer is particularly noted for his works on chemistry. His *Dictionnaire de la Chymie* was first issued in 1766.

Antoine Laurent Lavoisier (1743-1794), most famous chemist of his native France and victim of the guillotine during the French Revolution, has been given credit for first determination of the proportionate chemical composition of carbon dioxide, naming it "gaz acide carbonique." He also invented the gasometer, used in his studies of pneumatic chemistry, and was a member of the French commission of 1788 which developed and published the new nomenclature of chemistry. Yet Lavoisier's experiments with carbon dioxide were quite incidental in comparison to the vastness of the field of chemistry he covered, including his work on the essential element of all life which he named "oxygen."

Other French scientists and chemists, such as Laplace (1749-1827), Chaptal (1756-1832), and Fourcroy (1755-1809), also collaborated with and extended the works of Lavoisier in their relation to "gaz acide carbonique." In 1790 Chaptal, while professor of chemistry at Montpellier, published his monumental *Elements of Chemistry*, in which he summarized the work which had been done prior to that time on the medicinal qualities of the effervescent waters, and on the methods of their artificial preparation.

Antoine F. de Fourcroy also was a member of the commission on which Lavoisier served in the development of the new chemical nomenclature. Later, in 1805 as editor of *La Chymie (Encyclopedie Methodique)* he called attention to "gaz oxide de carbone" as a more exact title for the gaseous basis of effervescence in the mineral waters, and provided basis for the English terms "carbon-dioxide" and "carbonic gas."

TORBERN BERGMAN

The interest of Torbern Bergman (1735-1784), noted Swedish chemist, in the effervescent waters was concurrent with that of Priestley, and more extensive.² Bergman's studies began in 1770, regarding which he said in his autobiography—"I began to examine these waters in order to imitate them, which turned out so successfully that in 1771 I could drink artificial mineral waters with good results."

In 1773 Bergman described to the Royal Academy of Science in Stockholm his findings on the chemical constituents of various natural mineral waters, including their artificial preparation and impregnation with the gaseous factor of effervescence. He termed the gas "acid of air," and recognized it as the weakest of all known acids.

Bergman's later treatise of 1775, also published in the transactions of the Royal Academy of Science, was the result of his several years of study of the mineral waters and their effervescence. It was entitled *Treatise on the True Proportion and Artificial Production of Bitter, Seltzer, Spa, and Pymont Waters*. The greater part of this paper describes the development of Bergman's methods for making the different water by synthesis. It outlines the features of his apparatus, which was based upon impregnation by absorption, as well as the "shake-up" method of Priestley, and includes an illustration of apparatus which in principle was quite similar to that used by Priestley.

Contemporaries and associates of Bergman included Karl Wilhelm Scheele (1742-1786), and Johan Gottlieb Gahn, and they shared Bergman's interest and work in the intriguing subject of duplicating the effervescent waters. Scheele the pharmacist became noted for his many outstanding accomplishments in the field of chemistry, including his discovery of tartaric, citric, hydrofluoric, and many other acids, his isolation of phosphoric acid, and his independent discovery of oxygen.

Aside from his work with Bergman and his early activity in the bottling of the artificial effervescent waters he prepared, Gahn is noted for his research on phosphoric acid at the time of Scheele. Gahn also was instrumental in bringing together those two most noted scientists of his time—Bergman and Scheele.

EARLY BRITISH INTEREST

Meanwhile, in Britain, the interest of its medical men and other scientists was centered in the chemistry of gases, with particular

emphasis on discussions of the "fixed air" of Dr. Black, outlined previously.

Dr. David Macbride (1726-1778), prominent surgeon of Dublin, shared this interest, and was one of the first to attribute important antiseptic and antiscorbutic properties to the gas and to waters impregnated with it. He also noted the presence and functions of carbon dioxide in the blood stream.

Some years prior to Black's work, Dr. William Brownrigg (1711-1800) had presented data to the Royal Society of London, confirming the theory that it was this "fixed air," which gave the effervescence to the well known natural waters of Spa and Pymont, and which he called "mephitic air." Brownrigg is recognized as the earliest to demonstrate that identity. As early as 1741, in a paper before the Royal Society of London, he discussed the means of artificially aerating water in imitation of the Pymont water, and thus may have anticipated the efforts of Venel. Later during the years 1765-1774, Brownrigg reported at length on his studies to the Royal Society. His biographer of 1801, Dr. Joshua Dixon, credits to Brownrigg the discovery of imitating Pymont water, by impregnating water with "fixed air."

The English scientist Stephen Hales (1677-1761), in 1727 had made findings regarding the nature and properties of the gas, prior to Black's work, and had developed a method of collecting gas over water, as a means of experimentation and their quantitative measurement. His later studies were published in 1739. Hales also is noted as the first to make observations on pressure of the blood in the arteries.

The famous Hon. Henry Cavendish (1731-1810), in a presentation he made before the Royal Society of London in 1766, outlined the properties of water for absorption of carbon dioxide, and his means of measuring the gas absorbed by water. The details of his experiments are carefully recorded in his paper on *Factitious Airs*, read before the Royal Society in May of that year. In that paper he described and illustrated the apparatus used, which presents the essential features of the device later used by Priestley and illustrated in his pamphlet of 1772. Cavendish became particularly noted in the scientific field for his discovery of hydrogen and his determination of the composition of water with greater accuracy.

Other scientists, including Thomas Lane, apothecary, made similar studies, with interest quickened and encouraged by controversy between Dr. C. Lucas of London, and Dr. John Ratty, a Dublin physician, over whether the "fixed air" had the acid properties which some were denying. Both published books on the nature of the waters and their effervescence.

Several of the papers of Macbride and Lane appeared in the Transactions of the Royal Society of London. Dr. Macbride was interested primarily on the nature and properties of the "fixed air." Lane, in 1769, reported on the importance of his conclusion that

knowledge of the properties of "fixed air" in water and its effect on iron may solve the problem of imitating natural mineral waters.

JOSEPH PRIESTLEY

Joseph Priestley (1763-1804), noted British clergyman-scientist, started his experiments with "fixed air" in 1767-8, including attempts to combine it with water in simulation of the natural waters. This he did in a brewery in Leeds, using the gas over the fermenting vats. Relying upon the facility of water for absorbing the gas, his initial method involved pouring the water from one vessel to another, with both held as near as possible to the yeast fermentation.

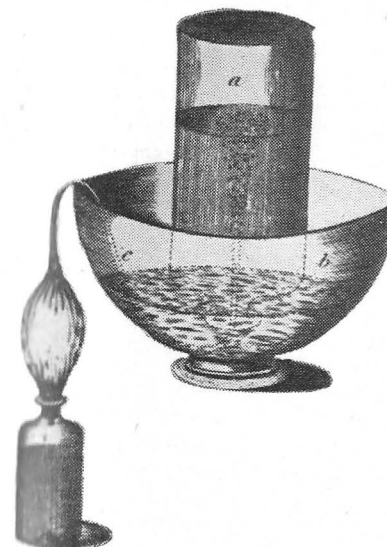
Later, in 1772, he published his report on *Directions for Impregnating Water With Fixed Air, In order to communicate to it the peculiar Spirit and Virtues of Pyrmont Water, And other Mineral Waters of a Similar Nature*.³ In this pamphlet Priestley described how he generated the gas in a bottle containing the alkali and acid, from which it passed by a tube into a bottle containing the water to be impregnated. This latter bottle was suspended in inverted position in a basin of water to avoid loss of the gas, and to permit ejection from the bottle of that portion of the water replaced by the gas collected above the water level. The gas-water contents were then combined by shaking.

It was in 1772, also, that Priestley presented his paper entitled *Observations on Different Kinds of Air* before the Royal Society of London. It included a discussion of the values of carbonated waters and the general principles of the process of impregnation with "fixed air." For Priestley's contribution to science through his studies concerning "fixed air" and the mixture of liquids with it, but with special emphasis upon his recommendation that water impregnated with carbon dioxide would prevent sea scurvy, and should be useful for that purpose in medicine, he was awarded the Copley Medal in 1773 by the Royal Society.

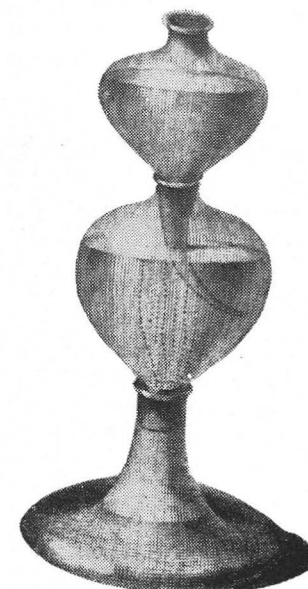
It seems quite obvious that Priestley's experiments with "fixed air" were not especially new, in view of what had gone on before, and the Royal Society's award noted this, indicating that the novelty of his idea was the use of carbonated water in a medical way during ocean voyages. In making the award to Priestley, Sir John Pringle, then President of the Society, cited the basis for Priestley's knowledge to be the work of Dr. Black, Dr. Macbride, Dr. Cavendish, and Dr. Brownrigg.

Priestley's studies and papers on air and the gases were extensive in the years which followed, and included numerous observations on the properties and characteristics of "fixed air," and on the impregnation of water with it. He is generally credited with the discovery of oxygen (which he called "dephlogisticated air") as his greatest accomplishment.

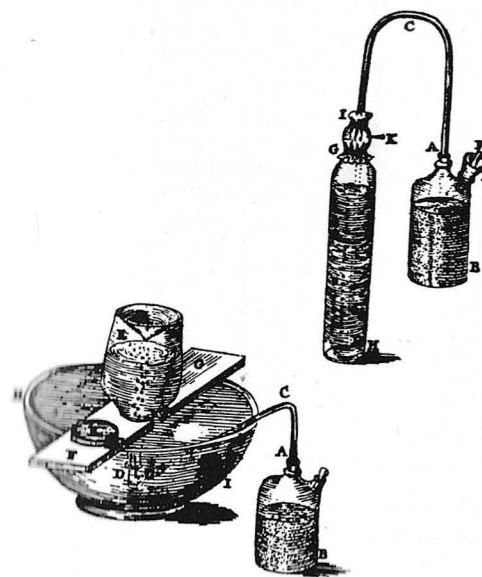
Terminology was in process of further development, too, as a result of the studies made. Bergman called the gas he generated from chalk and vitriol "acid of air" or "aerial acid." He also used the term



Priestley's Apparatus: 1772



Nouth's Device: 1774

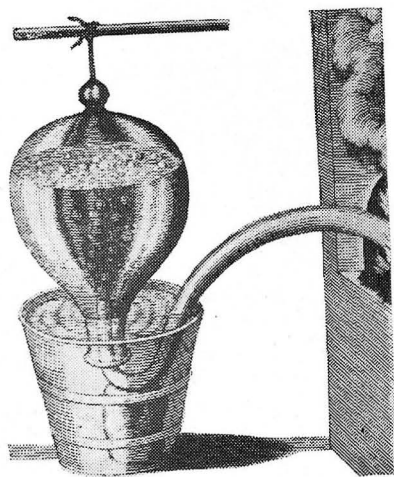


Bergman's Apparatus: 1775

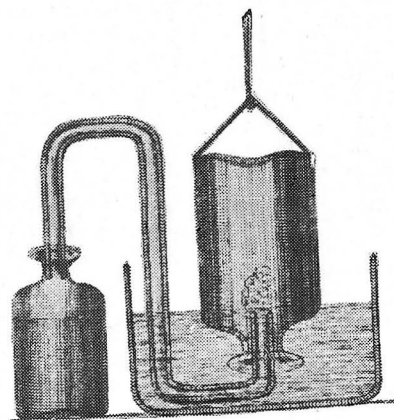


Briet Gazogene: Mid-1800s

EARLY EUROPEAN DEVICES FOR CARBONATING WATER



Method of Collecting Gas Over Water in Closed Vessel
Stephen Hales: 1727



Apparatus for Generating Carbon Dioxide and Impregnating Liquids
Cavendish: 1766

EUROPEAN EXPERIMENTAL DEVICES

"aerated water." Macquer called it "mephitic gas." Bucquet referred to it as "spirit of chalk." Others named it "gaseous acid." Lavoisier called it "Gaz acide carbonique." In 1792 Fourcroy, in *Encyclopedie Methodique*, used the same terminology. In 1805 he suggested as more appropriate the term "gaz oxide de carbone."

Therefore, by 1805 European chemists had become aware of the more accurate name based on its chemical composition, properties, and formula—i.e., carbon dioxide.

PRACTICAL USES APPEAR

The few remaining years of the 18th century following Priestley's experiments in impregnating water with "fixed air" were characterized by a rapidly increasing appreciation of the artificially carbonated waters, and progress in their manufacture on a commercial scale.

The medical uses, particularly, of the waters were being given attention, with numerous reports during the late 1700's by physicians and scientists, including Dr. William Falconer, Dr. Matthew Dobson, Dr. John Moncreiff, Dr. Tiberius Cavallo, and others.

Another physician, Dr. John Mervin Nooth, had devised an improvement on the method used by Priestley for impregnating the water. This he demonstrated to the Royal Society of London, in December, 1774, and it was referred to in the papers of the physicians previously mentioned.

The Nooth device, with improvements, continued to be used for making small quantities of carbonated waters, such as for home use, during most of the 19th century, and it can be said to have been an important factor in the early commercial development of the artificial mineral water, and soda water business in England and other European countries.⁴

By 1781 Thomas Henry, apothecary of Manchester, had improved on the Nooth device for making of the artificial effervescent waters in the larger quantities needed for public dispensing. Thomas Henry was the father of Dr. William Henry originator of the famous "Henry's Law" in the chemistry of gases (1803).

3

European Commercial Origins

BERGMAN, GAHN, AND HENRY

The early European studies of effervescent waters and their artificial preparation, and the recognized beneficial nature of their uses, could have but one result—making them commercially available.¹

With one notable exception, it would appear that those who experimented with synthesis of the waters, including the gaseous effervescence, had little to do with their entry into the world of trade. That exception was the Swedish scientist, Torbern Bergman, and even his participation was quite indirect and incidental. Bergman's publication in 1773 of his paper on carbon dioxide, and his dissertation in 1775 on the waters and their artificial preparation, are held by some to have caused the first commercial production as bottled products.

Bergman, of course had previously made them for his personal use, as he reported. But, so tradition says, as early as the spring of 1776 he gave encouragement to one of his pupils, chemist Johan Gottlieb Gahn, to compound and start bottling them for general use at Falun, Sweden. It was a modest beginning, taking place "out of doors under a roof close to a well of fresh spring water." Gahn called his place "Nya Mineralvatten-Fabriken Falun," or The New Mineral Water Factory at Falun. It must have been a tedious process because his wife, who did the bottling, could only prepare three bottles an hour.

In England, Priestley's paper before the Royal Society of London in 1772 and his subsequent publications in the 1772-1777 period, were followed by new developments in the devices necessary for the impregnation of waters with carbon dioxide. Most notable and among the earliest of these was the ingenious apparatus for "aerating" small quantities of water, which was described and illustrated by Dr. John Mervin Nooth in 1774-1775. Nooth's device with improvements was to continue in use throughout the nineteenth century as the well-known gazogene or seltzogene.

Meanwhile, the close alliance of the physician and the apothecary must have been reason for the interest of Thomas Henry, apothecary of Manchester, in the preparation of Bewley's "Mephitic Julep" for his customers. This was between 1767 and 1781. Again, this was on a very small scale, for the apparatus was primitive, but the necessities of the situation were soon apparent, and Henry was one of the first to do something about that.

In 1781 Henry disclosed the details of an apparatus he had made and used, improving the capacity of Nooth's device by substituting a large cask for holding the liquid to be impregnated. With this larger chamber he could impregnate ten or twelve gallons of water at a time.

Duchanoy of Paris, in 1780, had the same objective and had described a similar apparatus he devised. Several others were working along similar lines, of whom recorded history includes such names as Withering, Haygarth, Massey, Carradori, and the Duc de Chaulnes.

The practical results of all of these efforts were no doubt embodied in the type of mechanical impregnating device used in London in the earlier years of the new century. One of them is described in *One Thousand Processes in Manufacture*, by C. Mackenzie (London, 1825). It included the gas generating vessel, a bellows (in the nature of a pump), and a carbonating chamber including dashers or baffle plates inside the cask containing the liquid to be impregnated. The cask was cradled in horizontal position, on axles, so that it could be rotated or rocked to promote absorption of the gas.

Meanwhile, Lavoisier's invention of the gasometer, in 1789, as a feature of his work on weighing and measuring gases, provided another of the essential pieces of equipment which was quickly adapted to the needs of the growing trade.

GOSSE AND MEYER

Perhaps the limited extent of the activities of Henry and Gahn is reason why Gosse, apothecary of Geneva, has long been named in the literature of the trade as the first to establish a factory on the Continent for the production of artificial mineral waters—in 1783. That he was using some mechanical means for promoting impregnation of the water with the gas may be another reason.

Then, by 1787, the Prussian Court Apothecary, Johann C. F. Meyer, had commenced the manufacture of artificial Seltzer water in Biettin, on a larger scale. Meyer's method appears to have been quite simple; but it was a non-mechanical operation in its entirety, using glass vessels.

As described by Trommsdorff in his 1809 book on *The Apothecary Art In All Its Branches*, Meyer filled bottles of three-quarts capacity with clear, cold spring water. Carbonic acid gas, produced in a separate container by mixing sulphuric acid with powdered chalk or marble, was conducted by a tube from the generating chamber into each bottle, forcing water out of it (apparently the bottle was first inverted in water). When the gas content reduced the water level to the desired point, the tube was removed from the bottle, which was then stoppered quickly and vigorously shaken. A form of "snifing" followed, by repeated removal of the cork for short intervals followed by more shaking. In this way the water became partially saturated with the gas, and air was eliminated.

Then sodium carbonate was added to each bottle, which again was thoroughly shaken. This was to promote additional gas content. The solution was then filtered through a linen cloth into Seltzer bottles. Acid salt according to formula was quickly added with minimum agitation to the contents of each bottle, which was tightly stoppered with a cork, tied on.

Meyer's use of the sodium carbonate as a means of increasing the gas content illustrates the early basis for designating such waters as "soda water."

PAUL, SCHWEPPE AND GOSSE

In 1789, at Geneva, Gosse was joined by Nicholas Paul. The latter, a capable mechanic, made improvements on the Carradori type of carbonating device being used. Then, to provide the business with the necessary finances, the third to become a member of their partnership was Jacob Schweppe, financier.

The venture was successful to a degree, with Paul becoming the prominent member of it. The firm name became "Paul, Schweppe and Gosse." History records their success by saying that during the firm's existence scarcely any mineral waters were imported into Geneva, and that they exported annually 40,000 to 50,000 bottles of artificial Seltzer water.

During the connection of Nicholas Paul with the firm, the Faculty of Geneva gave special recognition to his work by a "Declaration" presented on August 26, 1797, reading:

We, the undersigned, Physicians of the Faculty of Geneva, declare that, having submitted to our examination the factitious Mineral Waters prepared by Monsieur Paul, we have seen with singular pleasure that the means invented by the said M. Paul surpass all the attempts that have hitherto been made; that science, united to industry, has produced in his hands the happiest effects, since he can now with perfect ease furnish the public with a constant supply of artificial Mineral Waters stronger and more energetic than the same Waters when issuing from the laboratories of Nature; so that we can positively assert what Monsieur Paul and his laudable efforts has succeeded in rendering himself equally interesting to physicians, and useful to humanity in the cure of disease.

Paul did not stay with Gosse and Schweppe very long. Shortly after the close of the French Revolution, or in 1799, he went to the metropolis of Paris and opened his own business. There he is reported to have used the name of "Goldsmid," first locating in the Rue Montmartre, later moving to the Rue St. Lazare.

Shortly after his Paris operations began, Paul's works were inspected by a deputation from the National Institute of France, and in November, 1799, Paul presented a paper on "Preparation of Mineral Waters" before that official group. This was followed, a month later, by a report of the deputies of the National Institute who had investigated Paul's processes and products.

From that report of Messrs. Portal, Pelletan, Fourcroy, Chaptal and Vauquelin, Paul is shown to have kept abreast of developments in his special field, and was making use of all of the latest appliances devised for the impregnation of water with carbon dioxide. In contrast with the artificial mineral waters produced in Geneva, which

were only mildly effervescent, the French Faculty of Physicians, who also inspected his shop, reported that Paul's products "opened with the noise of a pistol shot."

The compression pump was used in Paul's process. While that was not entirely novel, since both Priestley and Lavoisier had suggested it, Paul nevertheless appears to have been first to make practical application of the force pump to carbonate water under pressure. He obtained a patent of one such device in 1797.

Paul's system relied upon the action of sulphuric acid upon chalk to produce the carbonic acid gas he used; for some waters he got it from chalk by means of heat. The washed and purified gas was then conveyed into strong casks, where it was mixed with the filtered water by pressure and agitation; a further description of Paul's process is given later.

The various waters made by Paul included Seltzer (or Selters) water, Vichy water, Bussans water, Vals water, Contrexville water, Balerne water, Plombieres water, Baresges water, Spa water, Seidlitz water, hydro-carbonated water and others. In each case the process was simple; the salts were placed in the bottles and the carbonated water was then added.

PAUL AND SCHWEPPE IN LONDON

Encouraged by his success in Paris, Paul went to London and, joining with a chemist named Harfield, there set up their mineral water business in Buckingham Street, Strand. A little later, in 1802, his establishment was located at No. 5 Bow Street, near the Italian Opera House.

In London, according to recorded history, another step in the commercial development of bottled carbonated waters took place. Paul claimed to have been the first to use glass bottles and is credited by some with having originated the egg-shaped soda water bottle, although Hamilton seems to have had the better claim. In any event, for his early interest in carbonated waters both before and after his arrival in England, British writers give major credit to Paul for the establishment of the trade on a commercial basis in Europe.

When the effervescent natural waters were first transported from the springs the earthenware bottle was the common container, probably because the common types of glass bottles would not withstand the internal pressure, especially as it was increased by rise in temperature or by shaking. However, earthenware was not always impervious to the gas, and as a result the waters lost some of their effervescence. As Paul's manufactured waters were more highly carbonated than the natural, they presented a greater problem, and caused him to turn to the glass bottle made heavy enough to withstand the pressure.

Meanwhile, about 1794, Schweppe went to Bristol, England where he started his mineral waters business anew. There Schweppe's trade increased rapidly. Then, in 1798, three Englishmen were taken into partnership, and the firm continued as Schweppe & Company.

Within a few years, therefore, Schweppe's mineral waters were in competition with those of his erstwhile partner Paul. This brought into sharp contrast the highly carbonated waters of the latter, and those of a milder effervescent type being produced by Schweppe. The latter seem to have been preferred by the British, who were amused by caricatures showing consumers of Paul's products as inflated balloons.

This preference was given some support by the physicians, probably influenced by the fact that the milder effervescence more closely simulated that of the natural waters—other types, according to their viewpoint, were unnatural. The medical nature of the bottled effervescent waters when Schweppe started his English business is apparent, for they were considered by the authorities to be patent medicine, and an excise duty of three pence on every bottle manufactured was levied.

The chemist or apothecary who distributed the products, therefore, received his supply of soda water with the duty stamp fixed over the cork, after the fashion of a proprietary medicine. When the tax was discontinued the customary appearance of the bottle was preserved by substituting for the tax stamp a paper strap of similar design, which appeared as a seal over the old fashioned cork. Its use in England is said to have persisted until the appearance of the metal crown cap.

The favor of the nobility no doubt was as desirable in those days as later, for in *The Times* of London, in 1818, is found the following advertisement of Paul's products:

NATURAL SELTZER WATER.—the Nobility and Gentry are respectfully informed, the above Water, recently imported, may be obtained at N. Paul and Co's Mineral Water Warehouse, 5 Bow Street, Covent Garden. Where also may be had, the Artificial Seltzer, Soda, Seidlitz, and other waters, in glass or stone bottles.

Similarly, in 1836 the Royal Warrant was granted to the Schweppe firm by the Duchess of Kent and Princess Victoria, afterwards Queen Victoria.²

THWAITES IN DUBLIN

In 1799 Augustine Thwaites organized in Dublin the business to be known for more than a century afterwards (A. & R. Thwaites & Company), and started the sale of carbonated waters on a large scale. Some years earlier the senior Augustine Thwaites was in business as an apothecary, and the junior Augustine Thwaites had developed a process of combining a solution of sodium bicarbonate with a small quantity of oil of vitriol, in a bottle quickly corked, to produce an artificial effervescent water. The firm was organized to put this product on the market. *Faulkner's Journal* of 1799 refers to them as "makers of soda water." An advertisement of Thwaites, dated April, 1801, refers to "artificial mineral waters such as Soda Water, Seltzer, Cheltenham, Rochelle, and Pyrmont." It also mentions refunds on bottles returned.³

Dr. Robert Perceval, first Professor of Chemistry at Trinity College from 1785 to 1809 who, in his lectures in 1800, discussed the medical virtues of the waters and recommended their prescription, appears to have assisted in the Thwaites enterprise.

OTHER BRITISH PIONEERS

History is not definite concerning the year in which production of flavored carbonated waters began in Europe, other than the probability that Gosse made some of them in Geneva. But a clue to the close connection between the popular mineral waters and development of the flavored types is given by the fact that as early as 1790 William Pitt was engaged in the brewing and sale of ginger beer, forerunner of the carbonated ginger ale. Pitt & Co's advertisement of ginger beer and soda water appeared in the *Morning Chronicle* of 1819.

Some years later, in 1858-1861 Pitt's successor Erasmus Bond produced and patented "an improved aerated liquid known as 'Quinine Tonic Water,'" and put it on the market as "Pitt's Aerated Tonic Water."

In 1818 another new British factory was started. The firm of John G. Webb, Ltd., record their manufacture of soda water back as far as that year. "Webb's Soda Water" was supplied under Royal Warrant to King William IV (1830-1837).

Of some importance and interest is the fact that the first British patent for a method of impregnating water with carbon dioxide was issued to Henry Thompson, of Tottenham, Middlesex in 1807 (No. 3077). This was promptly followed by the device for making aerated waters patented in 1809 by William F. Hamilton, discussed later herein.

Hamilton's patent of 1809, incidentally, also mentioned his use of various solutions of salts, spirits, vegetable acids, aromatic oils, sugars, etc. "for saturation and supersaturation with carbonic acid." Another British patent, issued to F. C. Bakewell in 1832, while relating primarily to mechanical apparatus, also covered saccharine waters. The Bakewell patent is frequently referred to as the first British patent for sweetened water. By 1850 the commercial status of carbonated waters in Europe was on a sound basis.

In addition to the artificial mineral waters such as the unflavored soda water, "lemonade" appears to have been the most popular flavored "aerated beverage," although "orangeade" and "nectar" were also becoming known. At the Great Exhibition of 1851, held at Hyde Park, more than one million of the effervescent drinks were consumed. These were principally soda water, ginger beer, and lemonade.

Ginger beer, of course, was being manufactured, but in Ireland a new product based upon the ginger beer formula and known as "ginger ale" was made and found better adapted to the mechanical carbonation process. Various credits to Dr. Thresh and Dr. Cantrell (both of the firm of Cantrell & Cochrane, 1852), and to the firm of Grattan, Belfast (established 1825), the exact identity of the

originator of ginger ale and the date are subject to dispute. However, it does appear that the Belfast and Dublin types of ginger ale were being made in the 1849-1852 period. Cantrell & Cochrane began operations in Belfast in 1852, and in Dublin shortly thereafter.

BERZELIUS AND STRUVE

Meanwhile on the Continent, as the early years of the 1800's passed, the commercial manufacture of artificially carbonated waters became more widespread.

The German influence on the production of artificial mineral waters, for example, is illustrated largely by the activities of Dr. Friedrich Adolph August Struve (1781-1840).

Dr. Struve, the physician-apothecary, is considered a noted contributor to the European development of the trade. In Dresden, while proprietor of the Salomis-Apotheke, he became interested in the health waters from the famous watering places, and sought to duplicate them by synthesis. In 1818 the waters he successfully compounded, as imitations of those from the natural springs, were given approval by a number of doctors and scientists.

Faraday and Liebig pronounced Struve's artificial Karlsbad and Friedrichshall bitter waters to be identical in chemical composition and physiological action with the natural waters they represented. The noted and very critical German physician, Hufeland, approved the results of Struve's efforts, also.

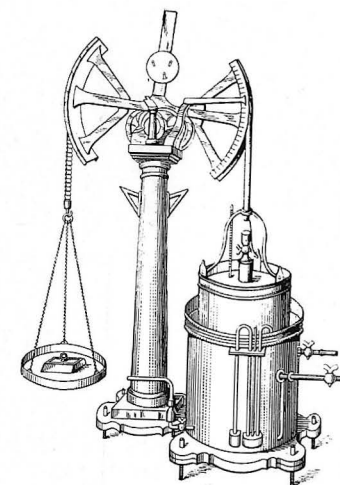
In 1820 Struve was operating a factory in Dresden for the manufacture of artificial mineral waters, as well as an elaborate "Trink Garten" or spa where his customers could relax while imbibing his products. Later the apothecary Soltmann of Berlin became associated with him, and in 1823 they opened a similar place there. Then others were started by them in Breslau, Frankfurt, Cologne, Konigsberg in Prussia, Leipzig, Hamburg, Hanover, Warsaw, Moscow, St. Petersburg, Kiev, Odessa, Riga, and Brighton.⁴

In 1821, according to his *Autobiographical Notes*, the famous Swedish chemist, Jons Jacob Berzelius (1779-1848) visited Dr. Struve's establishment in Dresden, where artificial Karlsbad water was being prepared. He was anxious to know something of the method used by Struve in its preparation, but found that Struve "made a secret of its preparation, although in everything else he showed us every possible courtesy."

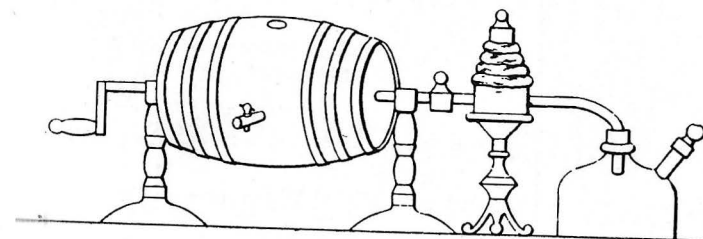
The interest of Berzelius in artificial mineral waters was of long standing. About 1800 he worked on their reconstitution at Upsala, where Bergman was located. In 1803 Berzelius had associated with Lars G. Werner, who had established a mineral water factory in Stockholm in 1799, as physician at "Werner's Spa." The venture ended in bankruptcy about 1806, but the interest of Berzelius in the subject endured for many years.



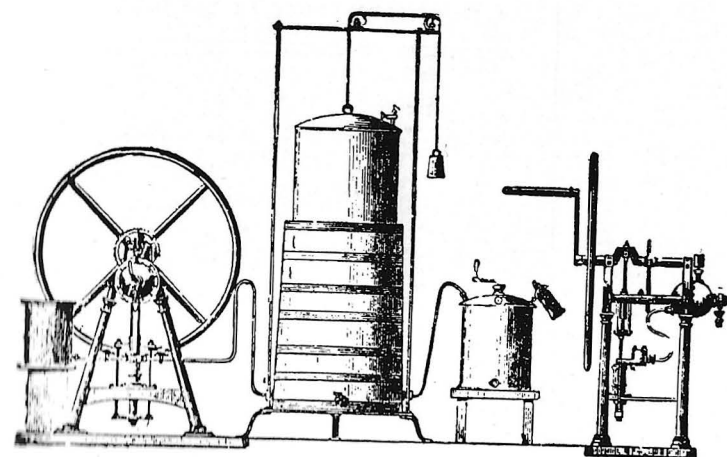
Henry's Carbonating Device—1781.



Lavoisier's Gasometer—1789.



Apparatus for Carbonating Water, London—1825.



Continuous System ("Bramah" Machine)—about 1820.

EARLY EUROPEAN CARBONATING EQUIPMENT

DIRECTIONS
FOR
IMPREGNATING WATER
WITH
FIXED AIR;

In order to communicate to it the peculiar Spirit
and Virtues of

Pymont Water,

And other Mineral Waters of a similar
Nature.

By **JOSEPH PRIESTLEY, LL.D. F.R.S.**

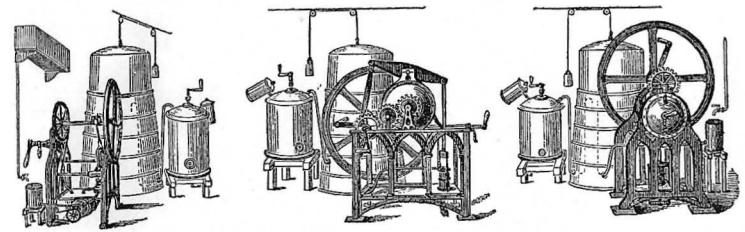
L O N D O N :

Printed for J. JOHNSON, No. 72, in St. Paul's
Church-Yard. 1772.

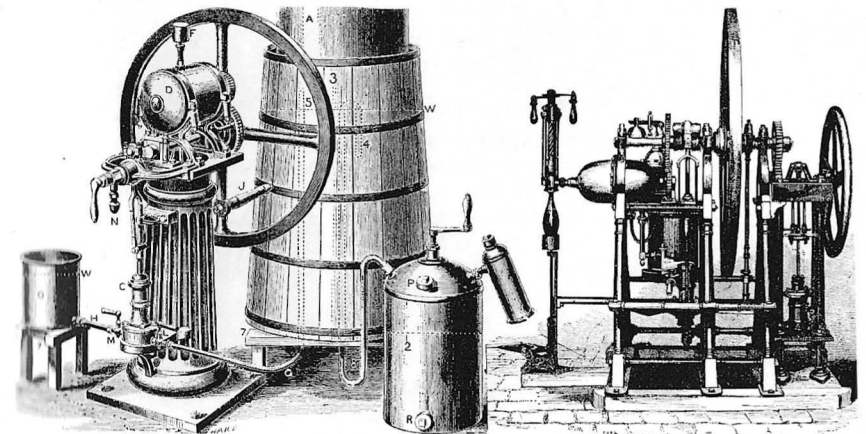
[Price ONE SHILLING.]

Facsimile of Title Page, Pamphlet by Joseph Priestley—1772
An original of this rare pamphlet is in the Library of Congress.

PRIESTLEY'S PAMPHLET

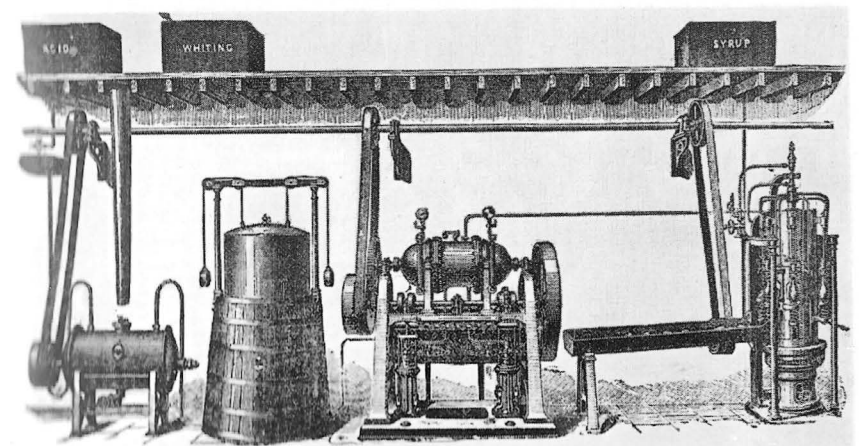


Soda Water Machines (Samson Barnett).



Soda Water Machine (J. Tylor & Sons); Steam Soda Water Machine with Bottling Apparatus (Benjamin Fleet).

Above Illustrations from "A Concise History of the International Exhibition of 1862," by Hollingshead (London, 1862).



English Soda Water Plant—About 1888.

BRITISH 19TH CENTURY SODA WATER EQUIPMENT

MECHANICAL PROGRESS IN EUROPE

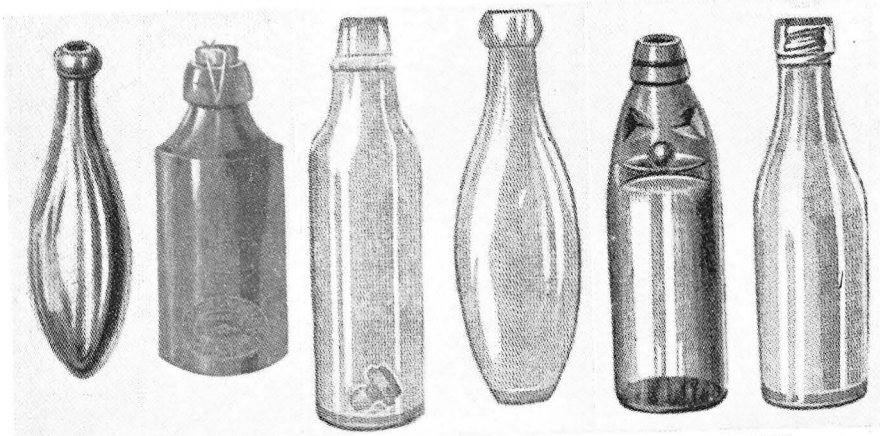
The *American Encyclopedia* of 1895 referred to Struve as the "Father of Artificial Mineral Waters." Whether or not that title was deserved in view of the many who preceded him seems questionable. British writers prefer to give that title to Nicholas Paul; his priority of many years is unquestioned. Struve has been credited with the introduction of numerous improvements in equipment, and was the author of several important observations on carbonated waters. But Paul, also, as we have noted, made his contributions to the technical advancement of the new industry.

In Kirkby's *Evolution of Artificial Mineral Waters* it is pointed out that with Paul's production of the waters on a commercial scale, their making henceforth called for two distinct classes of apparatus. On the other hand, there was the need for apparatus to carbonate small quantities of liquid for use in the family, or to meet the special requirements of the individual physician or pharmacist. Presumably, this means the types suggested by Bergman and Nooth. And on the other hand, it was necessary to have machinery suitable for their commercial manufacture upon a scale which would be sufficient to meet the public demand. It was the beginning of the mechanical phase of the bottled carbonated beverage industry.

In 1888 Sulz reported in his *Treatise on Beverages* that machines used in the early commercial manufacture of carbonated waters in Europe were based on the Geneva system. One cylinder, or vessel enclosing an agitator was used to generate the carbon dioxide. The gas passed into a gasometer which consisted of a large wooden cylinder, bound with strong iron hoops. The force pump was next employed to compress into the carbonating chamber the quantity of gas required to impregnate the liquid. Contents of the carbonator, after being impregnated with gas, were drawn off before the operation could be repeated. This plan of working was referred to as the "semi-continuous" plan.

A clear description of Paul's apparatus is lacking, but it very probably included a gasometer and a force pump, with the gas being compressed into casks containing the liquid to be impregnated, and from which it was drawn off into the bottles containing the salts or specific solution for the mineral water being synthesized. This became known as the "Geneva system," and was in the nature of an intermittent process. Its general principles continued to typify the method used on the Continent for many decades of the 1800's.

In Paul's system, as the cask of carbonated water was emptied, a new batch had to be put through the saturation process. Irregularity of gas pressure, as well as loss of gas in the bottling, were problems of Paul's process of filling. The effort to maintain high carbonation, from five to eight atmospheres of gas, no doubt added to the difficulties. These were met to some extent by having two carbonating cylinders, with the contents of one being bottled while contents of the other were being saturated. Thus, by use of two or more of the devices in sequence, on the battery principle, some semblance of



SOME ENGLISH SODA WATER BOTTLES OF THE LATE 1800's
Sofa Drinks Trade Journal: October, 1954.



SOME AMERICAN SODA WATER BOTTLES OF THE LATE 1800's
National Bottlers' Gazette: December, 1892.

continuous production could be had. Yet it had its inconveniences and that no doubt did much to promote the popularity of the continuous system of Bramah.

HAMILTON'S SYSTEM

To William F. Hamilton is generally given the credit for first generating carbon dioxide and impregnating the waters by the "continuous system" which was to typify British operations, particularly, through the 1800's.

Hamilton was associated with the firm of A. & R. Thwaites, mineral water manufacturers of Dublin, and received his first patent on his aerating devices from the English Government in 1809 (No. 3232); another was patented in 1814 (No. 3819). In these he mentioned use of the egg-shaped or "ovate" soda water bottle, which he had developed.

Hamilton's later device is described as based upon the principle of forcing a measured quantity of gas and water into a small condenser, under pressure. From there, the water being impregnated, it was drawn off into bottles. Provision was made for supplying under pressure both the liquid and the gas without interruption—hence continuous. The gas was conveyed from the generating chamber from whence it was pumped into the carbonating chamber, as was the liquid, in regulated volume. This chamber, or condenser, was so devised that it could be oscillated, thus inducing more rapid absorption of the gas. The liquid, when saturated, was drawn off through a tube controlled by valve, directly into the bottle.

THE BRAMAH SYSTEM

The Bramah system, or continuous process, was named after Joseph Bramah (died 1814), noted British inventor and manufacturer of early forms of the hydraulic press, improvements in boilers and the steam engine, the banknote printing machine, and others. Just how extensive may have been Bramah's activity with the process, in view of his early death in Hamilton's period, is not apparent, but by 1820 the Bramah system had largely superseded the Hamilton device with modifications which include use of the gasometer of Lavoisier.

Early development of the Bramah system is credited to his pupil William Russell (died 1835), who organized a firm in 1815 to make equipment of that same general pattern. Russell was joined by John Briggs in 1827, and his activity continued until 1874. The Russell-Briggs company was the forerunner of the firm of Hayward Tyler & Co., organized in 1835. Tyler, also, is credited with further improvements on the Bramah equipment.

Briggs has been recognized as the inventor of what was probably the first bottle filling machine separated from the carbonating device. Early practice, as in the Hamilton and original Bramah machine was to fill the bottle from the valve-regulated filling cock immediately connecting with the carbonating chamber—a manual operation in its entirety. The Briggs filling device, which he developed about

1830, included a foot-operated treadle for raising and holding the bottle at the filling valve, and the cork-compressing and piston method of inserting the cork into the neck of the bottle. Both of these were important features of the bottling tables used in Europe, and in America, until early in the 1900's.

The "snift" was an important feature of the manual bottle-filling process, and it was later added to the filling device, such as that of Briggs. The principle of counter-pressure, as a further aid to the bottling process, was a development of Savarese in France, about 1837. Its use in other ways had been suggested in British patents as early as 1814.

The English patent (No. 6,238) issued to F. C. Bakewell in 1832 represented one of the earliest attempts to combine the gas generator and the carbonating cylinder (later known as the "fountain" in the U. S.). For necessary strength, the cylinder was made of iron and lined for protection against the acid. In vertical position, it rested upon a stand and pinions on which it could be rotated, or rocked.

Bakewell's device was preceded by a few years with renewed attempts in England and France to use the method of carbonation by chemical pressure. In this the saturation of the liquid had to be accomplished by the pressure of the gas alone, aided by agitation of the contents of the carbonating cylinder. However, the control of the gas pressure produced by the generator was a serious problem, since no gasometer was used, and the devices were hazardous.

The use of steam power was started in the mineral water factories of England shortly after mid-century and, of course, added much to the capacity for production of the early equipment. One of the Tylor machines of the period, according to the literature, was capable of producing 120-130 dozen bottles of soda water per day by hand power. The use of steam power increased that production to 300 dozen bottles per day.

THE SIPHON BOTTLE

The siphon, which was the popular container for the effervescent drinks being made on the Continent, as contrasted with the early popularity of the stoppered bottle in England, was an early European development. Its principal purpose was to permit use of a portion of the bottle's contents while retaining the carbonation in that which remained. Charles Plinth, who patented the "Regency portable fountain" in 1813, was the first (Br. Pat. No. 3680). His device was similar in principle to the siphon of the early 1900's, except that he used a "stop-cock" instead of the spring operated valve.

Another type, called the "siphon champenois" was patented in 1829 by Deleuze and Dutillet, jewelers of Paris. This consisted of a hollow corkscrew which was inserted through the cork into the bottle, with the part remaining outside the bottle formed as a spout. A valve in the spout, operated by a lever, permitted the internal pressure to force liquid from the bottle.

It was not until 1837, according to Kirkby, that the siphon of Deleuze and Dutillet and the fountain of Plinth had undergone the combination necessary to convert them into the well known siphon bottle, or "vase syphoide," which Savaresse patented in Paris, in that year. The convenience of this type of device, permitting partial use of a bottle's contents, resulted in numerous adaptations of it in the dispensing of carbonated waters.⁵

While in America the marble counter fountain became the principal method of dispensing carbonated drinks during the 19th century, that method was hardly known in Europe. On the Continent the siphon became the preferred dispensing means, just as the bottle did in England.

EARLY BOTTLES AND CLOSURES

As previously shown, Paul's early use of the stone or earthenware bottle soon found it to be unsuitable for the mineral waters he was making, with their high carbonation, because of the loss of gas due to the porosity of the material. Yet use of the so-called stone bottle continued for many types of carbonated liquids for a long time; even into the earlier years of the twentieth century for some of them.

The egg-shaped glass bottle early found favor, and also continued in use throughout the nineteenth century, although in declining degree with the adoption of closures other than the cork. A purpose of the egg-shaped bottle was to keep the liquid in contact with the cork, to keep it moist, and thus to prevent leakage. The cork was tied on with string or cord; later with wire, and the devices made to do the wiring were ingenious, and many. The hinged wire clamp for securing the cork in the bottle was a distinct advantage and was widely used. The "swing" stopper was another improvement.

Early glass bottles of the flat-bottomed type were of numerous shapes, but generally typified by long necks and heavy bodies. The longer body and shorter neck later became more popular, and these in turn assumed many styles of contour and finish, due largely to the nature of the closure then in popular use.

The English use of substances other than cork for closure purposes began at an early date. Kirkby reports that William F. Hamilton (of Thwaites) was using glass and earthen stoppers in 1809. Screw stoppers of glass and earthenware were introduced in 1843. And in 1864 Edward Hamilton invented and patented in England the internal ball stopper, made of rubber. Wide use of the internal stoppers was made during the general period from about 1875-1880 to the end of the century. This was accompanied by use of swivel or swing types of outside stoppers, also, as in the U. S.

In Europe, during that period the internal stoppers were made of wood, of ebonite, of rubber, or of glass. In England the "Yoglen patent" was illustrative of the wood stopper; while "Lamont's Patent Stopper and Bottle" and "Vallet's" used the ebonite plug. "Chapman's" ball stopper bottle used a sphere which was of either solid rubber or rubber-coated.

Of all the internal stoppers, British writers recognize the Codd bottle as having been the favorite. In it the glass sphere, or "marble," was used for the internal closure. Internal pressure kept it in place against a gasket of rubber or other material in the bottle neck. The bottle was formed with indentations near the shoulder which were devised to retain the glass ball, after it had been pushed from the opening, so that the liquid could be poured without interference. Codd obtained British and U. S. patents on his novel bottle and closure in the early 1870's.⁶

Eventually superseding the Codd bottle, and by far the most popular type of closure in England during that entire period, was the "Champagne" shape screw finish bottle with flat-top screw stopper. This was devised during the 1870-1880 period by Henry Barrett, later of Barrett's Screw Stopper Bottling Co., London. His early type was followed by scores of variants. One of these, developed by F. G. Riley (1885) and known as the "thumbscrew" or chisel-head pattern, became very popular on the Continent.

MID-CENTURY EUROPEAN STATUS

The development of equipment for mineral water or "aerated beverage" manufacture in England during the first half of the 19th century is well illustrated by some of the exhibits at the International Exhibition of 1862, held in London. Several types of soda water apparatus were shown, according to the official history of the event.⁷

Samson Barnett displayed three types of gas generating and carbonating equipment, and a bottling machine. His "direct and beam action machines" came in three sizes, producing 140, 160, and 200 dozen bottles per day, respectively. Two sizes of "hand-action machines" produced 100 and 120 dozen bottles per day. At that time, according to the record, many of these machines had been in constant use for twenty-five years. "Double-action Machines, for making lemonade and soda water at the same time, or for making either separately" were in three sizes—280, 320, and 400 dozen bottles per day. The "patent bottling apparatus" included "the usual nipple for knee-bottling."

The official account of the exhibit makes this further reference to the equipment of Barnett, and of others—

The continuous action of this, and of the apparatus exhibited by Hermann-Lachapelle, Fleet, Tyler, and Tylor, consists in having the carbonic gas drawn continuously from out of the gasometer by a pump which forces it into a strong condenser, together with a certain quantity of water, their relative proportion being regulated by the comparative opening of the two cocks. The spherical condenser, which is subject to a great pressure, is ordinarily made of brass sheet, soldered about the middle. To avoid the danger of this disposition, Hermann-Lachapelle makes it of cast brass, and moreover provides it with a safety-valve and an alarm-whistle to inform the attendant of the dangerous pressure.

The apparatus exhibited by Fraude and by Gressler were remarked by the Jury for their excellent construction, the first being a good combination of the systems of Struve, Saltmann, and Bramah. The small apparatus exhibited by Francois is well contrived and beautifully constructed.

The jury honourably mentioned also the domestic apparatus exhibited by Mondolot, who have improved Briet's system; and an improved method of closing bottles and syphons exhibited by Rouget Delisle, which renders easier and surer the manufacture and use of syphons so much employed by drinkers because of their convenience.

Benjamin Fleet exhibited a "steam soda-water machine, with patent bottling apparatus affixed." According to the contemporaneous account—

The steam soda-water machine is an improved method of manufacturing and bottling soda-water, lemonade, ginger-beer, and all kinds of mineral waters and aerated drinks, by means of a patent screw bottling apparatus, which forces the cork into the bottle without the aid of a mallet, and being elevated by a treadle, and pressed firmly against a suitable packing ring, on the under side of the filling piece, the air is excluded, and the otherwise dangerous operation entirely prevented. A further improvement is the application of a small steam cylinder, combining in one machine, the apparatus for making the soda-water, and a steam engine for driving the same, which being connected to the same shaft, the fly wheels answer the purpose of both.

The machine produces 2,500 bottles per day (or over 200 dozen), and the principal features of the invention are the mechanical contrivances for the entire exclusion of all atmospheric air, and the ease with which it can be worked by non-professional men.

J. Tylor & Sons exhibited their "soda-water machines," to produce from 50 to 360 dozen bottles per day, and which had been awarded prize medals at the Great Exhibition of 1851 in London, as well as at Dublin in 1853 and at Paris in 1855.

An exhibit by R. H. Macord of machines, tools, and utensils used for bottling wine, spirits, beer, etc., included a treadle operated revolving brush, designated as a "bottle-washing machine."

The closing of the report of the London Exhibition of 1862, in its reference to this type of equipment, is significant. "The machines for the manufacture of aerated waters are very numerous, and are generally well constructed. It could hardly be otherwise with the manufacturing machinery required by an industry which becomes daily more extended."

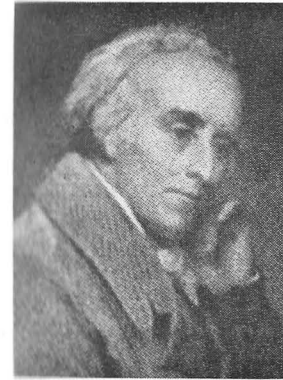
* * * *

The foregoing is not presented as a complete history of the carbonated beverage industry in Europe during the early part of the 19th century. Since it is based almost entirely upon trade literature in the English language, and certainly not upon all of that, it is more than a probability that further study would show many others, and several other countries, participated in development of the trade.

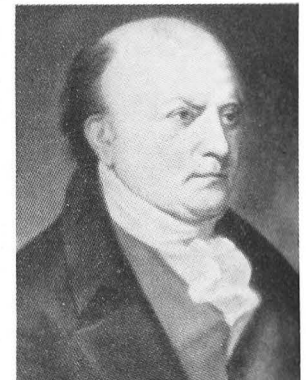
However, it does present some of the major incidents connected with the transition from the experimental stage to the commercial preparation of bottled carbonated waters in Europe, as background for some of the events which were taking place across the Atlantic.⁸ As will be seen from later Chapters, the American industry in all of its stages from 1800 seems to have developed with a minimum of resemblance to the European industry or its products.

PART III

The Early Development of the Flavored Carbonated Beverage in America, 1807 - 1900



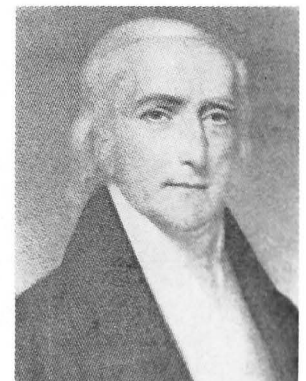
Dr. Benjamin Rush
1745-1813



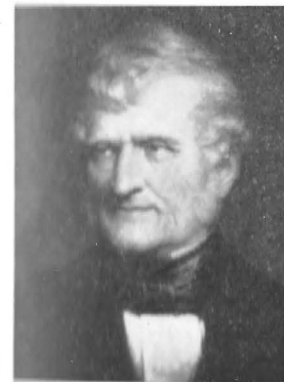
Thomas Cooper
1759-1839



Dr. Samuel L. Mitchill
1764-1831



Dr. Philip Syng Physick
1768-1837



Robert Hare
1781-1838



Dr. Benjamin Waterhouse
1754-1846

I. EARLY AMERICAN SCIENTISTS



Courtesy Yale University Art Gallery

Benjamin Silliman
1779-1864

II. EARLY AMERICAN SCIENTISTS

4

American Scientific Background

MEDICAL INTEREST

The beneficial values of drinking water have for ages been a subject of importance to the physician as well as to the layman. Perhaps the first work on the qualities and uses of water published in this country was that entitled *The Curiosities of Common Water, or the Advantages Thereof in Curing Cholera, Intemperance, and Other Maladies*, by John Smith, C.M. Reprinted in Boston in 1725 from a London edition of 1712, the volume calls special attention to the excellence of water as a drink, and enumerates some of its therapeutic uses.

It seems quite natural, therefore, that early European attention to the added attributes of effervescent mineral waters, and their artificial preparation, was being duplicated to a degree in America by the interest of those credited with our early achievements in the field of science. And this meant particularly those in the profession of medicine.

In the later portions of the 1700's, notwithstanding rapid growth of the thirteen colonies and their successful fight for independence, America was almost totally lacking in institutions of medical education. At the time of the Revolution there were two colleges of medicine—one, the Medical School of the College of Philadelphia (now the University of Pennsylvania), founded in 1765, and the other King's College (now Columbia University), founded in 1768. Medical schools opened at Harvard in 1783, Dartmouth in 1797, Maryland in 1807, and at Yale in 1810.

Most of those classified in the medical profession had obtained their training in medicine by a system of apprenticeship lasting from three to seven years. Others, of course, had taken advantage of the educational facilities offered by the celebrated schools and universities of Europe. And it was largely in connection with medicine, and the allied sciences of chemistry and pharmacy, that the studies were being made in Europe of effervescent mineral waters and their simulation and carbonation.

The relative scarcity of early American literature relating to similar studies in this country leaves much to be desired from the standpoint of like developments here, and yet it is not difficult to see that the long-established research interest in carbonated waters of the European scientists and physicians was providing the seed for early growth

of similar interest among their brothers across the Atlantic.¹ And some of America's early leaders in those fields were among them.

STATESMEN-SCIENTISTS

Dr. Benjamin Rush (1745-1813), native of Philadelphia, its renowned physician, and teacher of medicine and chemistry during the Revolutionary and early Republic periods was one of these. He had studied under Dr. Black, at the University of Edinburgh, from which school he was graduated in 1768.

In 1773, Dr. Rush appeared twice before the American Philosophical Society in Philadelphia, to read papers on the mineral waters of Pennsylvania. One of these papers related to *Experiments and Observations on the Mineral Waters of Philadelphia, Abington, and Bristol, in the Province of Pennsylvania*, and the other concerned *Directions for the Use of the Mineral Waters and Cold Baths of Harrogate, near Philadelphia*. Both were later published in Philadelphia.²

James Madison (1751-1836) and Thomas Jefferson (1743-1826) were engaged in scientific pursuits, as well as politics, and in their writings both touched on the subject of the medicinal waters of the natural springs of Virginia. Madison, in correspondence with David Rittenhouse, of Philadelphia, showed his familiarity with "waters artificially impregnated with fixed air, extricated from chalk, by means of the vitriolic acid."

Jefferson in his own right was a scientist as well as a statesman. In his *Notes on the State of Virginia* (prepared 1781, first published in Paris 1784) he commented at length upon the medicinal waters of the natural springs in that region.

Rittenhouse (1732-1796), of course, already was one of America's famous scientists and was recognized as its outstanding astronomer. Upon the death of Benjamin Franklin (1706-1790) he succeeded him as the second President of the American Philosophical Society and, like Franklin, held that office during the remaining years of his life. Franklin had served since the organization of the society in 1743. Rittenhouse was followed in office by Thomas Jefferson, and it was held by him for eighteen years, including the period of two terms as President of the United States.

John Adams (1735-1826) who preceded Jefferson as President, also had some of the latter's interest in science and philosophy. Frequent questioning about the Philosophical Society of Philadelphia while he was in France during the early years of the American Revolution stimulated his interest in a similar scientific organization in Boston, and upon his return to that city in 1779 he proposed an Academy of Arts and Sciences there.

Charter for the new Academy was issued in 1780, with James Bowdoin as first president. It, too, numbered among its members such prominent personages as Washington, Jefferson, Franklin, John Adams, John Hancock, John Warren, Ezra Stiles and David Ritten-

house. Its journal, started in 1795, was the first of its kind in the scientific field published in New England.

SARATOGA AND BALLSTON³

The writings of Rush, Madison, and Jefferson on waters of the country's popular springs, are indicative of the interest of the time in the beneficial properties of the natural mineral waters, including their effervescence. That interest had been growing for many years, and was undoubtedly reason why many of the springs in later years attained wide popularity as health resorts. Prominently identified in the group were the springs of Saratoga and Ballston in upper New York State.

History records that Sir William Johnson, Major-General of the British Army which repulsed the French at Lake George in 1755, was the first white man to visit the springs at Saratoga, being directed there by the Indians. Recognizing the health values of the waters, in 1767 Johnson wrote about them to his friend General Philip Schuyler, Revolutionary general and statesman, and interested him in the health-giving waters.

A little later, in 1770, a Dr. Constable, of Schenectady examined the waters of Saratoga and Ballston, and pronounced them highly medicinal. In 1783 Dr. Samuel Tenney (1748-1816), a regimental surgeon in the Revolutionary forces stationed at Fishcreek, visited the springs and studied their waters. His findings were subsequently published in the *Memoirs of the American Academy of Arts and Sciences* (Vol. II, part I, 1793).

Worthy of note, also, is the attention given to the waters by General George Washington. While visiting General Schuyler in 1783, after victory and while awaiting operation of the Treaty of Peace, Washington was directed by Schuyler to the springs, which he examined and found of lasting interest.

In the following year (1784) Colonel Othy H. Williams, a friend and correspondent of Washington, wrote to him about a trip to the springs at Saratoga and made this comment on the carbonated waters:

... But what distinguishes these waters in a very conspicuous degree from all others, is the great quantity of fixed air which they contain. They are exceedingly pungent to the taste, and after being drunk a short time will often affect the nose like brisk bottled ale. The water will raise flour sooner than any other thing, and cannot be confined so that the air will not, somehow or other, escape. Several persons told us that they had corked it tight in bottles, and that the bottles broke. We tried it with the only bottle we had, which did not break, but the air found its way through a wooden stopper and the wax with which it was sealed ...

DR. SAMUEL L. MITCHILL

In 1787 Dr. Samuel Latham Mitchill (1764-1831), of New York City, reported that he visited the springs at Saratoga and "ascertained experimentally that the gas extricated from the water was fixed air." An account of his experiments was published in *The American Museum* (Philadelphia, Vol. IV, pp. 40-42, 1788), and later reprinted in early editions of *The American Geography* by Jedidiah Morse (London, 1789, 1792).

Mitchill, at the time of his visit to Saratoga, had recently graduated in medicine from the University of Edinburgh, where he studied under Dr. Joseph Black. Later he was to become one of America's foremost chemists, serving as Professor of Chemistry at Columbia University during the years 1792-1801. Also in later years, as editor of *The Medical Repository* (1797-1820) he engaged in controversial correspondence with Priestley regarding the phlogiston theory. Dr. Mitchill is also identified as one of the leaders in the movement for preparation of the United States Pharmacopoeia, and served as President of the first general convention for the formation of the pharmacopoeia which convened at the Capitol in Washington on January 1, 1820.

DR. VALENTINE SEAMAN

The first extensive scientific examination of the waters of Saratoga, however, appears to have been attempted in 1792, by Dr. Valentine Seaman (1770-1817), also of New York City. He received his M.D. degree that year from the University of Pennsylvania, after studies under Dr. Benjamin Rush. In addition to his interest in the natural waters, however, Seaman was familiar with the Nooth device for making the carbonated waters artificially, and outlined the process in his *Dissertation on the Mineral Waters of Saratoga . . . also a Method of Making an Artificial Mineral Water Resembling that of Saratoga*, first published in New York in 1793.

Seaman later prepared a second and more extensive edition of his dissertation, published in 1809, in which he undertook to defend the accuracy of his findings and those of Dr. Vandervoort, referred to later. Both reports had been opened to question by differing analyses published in the *Medical Repository* and in *The Monthly Anthology and Boston Review*. Critical comments on the new edition, appearing in the *New York Medical and Philosophical Journal and Review*, became the cause of acrimonious controversy between Seaman and the editors of the publication.

Dr. Seaman is principally recorded in medical history for his activity in promoting the practice of vaccination, being preceded in America only by Dr. Benjamin Waterhouse, of Boston. Just before his death in 1817 he participated with Dr. Samuel L. Mitchill in the preparation of a pharmacopoeia for the physicians and surgeons of New York Hospital, where he was engaged as teacher of clinical surgery. This book, one of the earlier types which preceded the United States Pharmacopoeia, was issued in 1816.

A similar study of the waters of Ballston was made by Dr. Peter Vandervoort, of New York. In 1795 the results of his experiments were published in pamphlet form under the title "A treatise, on the analysis of Ballston mineral spring water." Vandervoort's work included not only a qualitative but also a quantitative analysis, and was later reprinted in the *New York Medical and Philosophical Journal and Review* (Vol. II, p. 159, 1810).

DR. BENJAMIN WATERHOUSE

Dr. Benjamin Waterhouse (1754-1846), referred to above, and who was one of America's most distinguished medical men, also became interested in the Saratoga waters; his study of them was made in 1794. His account was later published by Morse in *The American Universal Geography* (1805 edition) including this observation concerning the effervescent feature:

The medicinal waters which have made this spot so famous of late . . . are brisk and sparkling like champagne. In drinking they strike the nose and palate like bottled cider, and slightly affect the head of some people, by their inebriating quality. They derive this exhilarating property from what some philosophers call the spiritus mineralis, or what Bergman calls the aerial acid; Fourcroy, the cretaceous acid; and Dr. Priestley, fixed air; and is that animating something which gives activity to yeast, and life to malt liquors. It is used in the neighborhood of the springs instead of yeast in making bread, and is found to raise it more speedily and effectually than any other ferment in ordinary use.

Dr. Waterhouse was professor of the theory and practice of medicine at Harvard Medical School, and was the physician who introduced Jenner's vaccination into America.

One result of the activity shown by publication of the foregoing papers, and others, during that early period was a more general knowledge of the beneficial properties of the natural mineral waters and their effervescence, and it gave impetus to the advancement of efforts, already in their formative stage, of making them by synthesis.

BENJAMIN SILLIMAN

Benjamin Silliman (1779-1864), who occupied a conspicuous place in scientific circles in America for more than half a century, was another of America's famous men who displayed keen interest in the artificially carbonated waters during the early years of the 1800's.

Silliman was graduated from Yale College in 1796 and, after an interval of teaching and an apprenticeship in study of the law, Silliman was elected professor of chemistry at Yale College in 1802, and served in that post until 1853. But he did not enter upon his duties at the College until he had prepared himself by two years of study under Dr. Woodhouse, at the medical school of the University of Pennsylvania. Among the few items of chemical apparatus with which Silliman began his instruction at Yale, in 1804, was one of the carbonating devices of Nooth, with which he had become familiar while studying under Woodhouse.

During the period of his training, in Philadelphia, Silliman, also took occasion to visit Dr. John Maclean, then professor of chemistry at the College of New Jersey, at Princeton. By Dr. Maclean he was provided with a list of books for study which included the chemistry works of Chaptal, Lavoisier, Fourcroy, Scheele, Bergman, and Kirwan, all of whom had included the properties of carbon dioxide, and the artificial carbonation of water, in their experiments and papers published in Europe.

In Philadelphia Silliman attended the scientific lectures of Rush, Barton, and Wistar, and also met the elder scientists Priestley and

Cooper. More important, perhaps, was the lifelong friendship he formed with the young Robert Hare—destined to win recognition as another of America's outstanding men in the field of science.

ROBERT HARE

Robert Hare (1781-1858) was a native Philadelphian, and son of the celebrated brewer of "Hare's American Porter." Prior to Silliman's coming to Philadelphia, Hare studied chemistry under Woodhouse, also; conducted his own independent experiments; and in 1801 presented before the Chemical Society of Philadelphia his account of the oxyhydrogen blowpipe, embodying his discoveries in the use of oxygen and hydrogen in combustion. This was the first of a long series of notable accomplishments by Hare in the field of science during a long lifetime, and the one for which he is principally noted. It won for him the Rumford Medal of the American Academy of Arts and Sciences, and was a reason for his election to membership in the American Philosophical Society in Philadelphia, in 1803. He was honored with an M.D. degree by Yale in 1806, and by Harvard in 1816.

In the winter of 1802, Benjamin Silliman arrived in Philadelphia, and met Hare at the boarding house where they both lived. In a little laboratory which they set up in the cellar-kitchen they jointly pursued their studies and their experiments, among which we may assume the characteristics of "fixed air" took an important part, for it was a subject of common interest at the time.

In the decades which followed Silliman's departure from Philadelphia in 1804, Hare was his constant correspondent, and in his chosen field acquired further fame as Professor of Chemistry in the Medical Department of the University of Pennsylvania for 40 years following 1819, and as a prolific author on scientific subjects. He contributed over 150 papers to Silliman's *American Journal of Science*, to the proceedings of the American Philosophical Society, and to the *Journal of the Franklin Institute*. Dr. Hare's *Compendium of the Course of Chemical Instruction*, used as a text for his students at the University, was first published in 1826 (with a fourth edition in 1840), and was one of the principal sources upon which Silliman was to draw for material on the characteristics of mineral waters, including effervescence, and their synthesis, for inclusion in his "Elements of Chemistry" (1830-1). Other Hare inventions mentioned by Silliman were his calorimeter (1819), deflagrator (1821), and the gazometer. Most of the illustrations used by Silliman were from the *Compendium*, including Hare's apparatus for impregnating water with carbon dioxide; Silliman freely credits those things to Hare in his text.

Edgar F. Smith, Hare's biographer, refers to him as "one of the greatest scientists of our country," and ranks him with Davy, Volta, Priestley, and Berzelius. Both Hare and Silliman were elected to honorary membership in the Smithsonian Institution, in 1849, at the same time as Washington Irving and Albert Gallatin.

DR. JAMES WOODHOUSE

The mentor of Silliman and Hare, Dr. James Woodhouse (1770-1809), studied medicine under the supervision and preceptorship of Dr. Benjamin Rush, after graduation from the University of Pennsylvania in 1790, and received his M.D. degree in 1792. However, he abandoned medicine for chemistry and, in 1792, founded the Chemical Society of Philadelphia. Later, when Priestley settled in Pennsylvania, he frequently visited Woodhouse's laboratory in Philadelphia and found in him a vigorous opponent of the phlogiston theory.

In 1795 Dr. Woodhouse became professor of chemistry at the University of Pennsylvania, making him one of that quartet of America's earliest instructors in chemistry which includes Dr. John Maclean of Princeton, Dr. Rush of Philadelphia, and Dr. Samuel L. Mitchill of New York. Each of these was engaged in that work at their respective colleges during the closing years of the 1700's.

Woodhouse, too, is noted for his contributions to the technical literature of the period, which would include his *Young Chemist's Pocket Companion*, published in Philadelphia in 1797. His biographer says—"Woodhouse's contributions to American chemistry were noteworthy in several ways. He was a pioneer in plant chemistry, in the development of chemical analyses, in the elaboration of industrial processes, and in use of the laboratory method of instruction in chemistry."

JOSEPH PRIESTLEY

Writers in the field of science credit some of its early advancement in America to the indirect effects of the French Revolution, by its influence on the emigration to this country of such men as Gallatin, Adet, DuPont de Nemours, and others, including Joseph Priestley and Thomas Cooper.

The Reverend Doctor Joseph Priestley emigrated to America from England, arriving in New York in the summer of 1794. He went to Northumberland, Pennsylvania, to live. There he died in 1804, at the age of 71. During the last decade of his life, in America, theology took a stronger hold of Priestley than science, and although he lectured and wrote much during that period, aside from his defense of the phlogiston theory his published topics were principally theological in nature.

Yet Priestley's influence in the field of science was not entirely lost to his new country. He traveled from Northumberland to Philadelphia quite frequently, and read a number of papers there before the American Philosophical Society. He was a frequent correspondent with others interested in the scientific arts, such as Jefferson, and Dr. Samuel L. Mitchill, who edited *The Medical Repository*, in New York. He no doubt met other leaders in that field, including Dr. Rush, and Dr. Woodhouse of the medical school at the University in Philadelphia. Silliman made his acquaintance while in that city. And there was friendship of long standing between Priestley and Thomas Cooper; they lived together in nearby Northumberland and collaborated in chemical studies.⁴

THOMAS COOPER

Thomas Cooper (1759-1839), born in London, took some part in revolutionary activities in France and avoided a threat of the guillotine by escaping to America. Settling in Pennsylvania, and pursuing the practice of law, his attention in later years of his life turned to the field of chemistry. In it he was to win recognition as one of America's pioneer industrial chemists.

In 1811 Cooper was appointed Professor of Chemistry, mineralogy and natural philosophy at Dickinson College, in Carlisle, Pennsylvania, where he stayed until 1815. Later he served as professor at the University of Pennsylvania, and in 1821 became professor and president of South Carolina College (later University of South Carolina), remaining at the latter school until 1834.

Of more direct interest in this discussion, however, is the fact that he was also editing the *Emporium of Arts and Sciences*, a periodical published in Philadelphia in 1813-1814. In the 1814 volume of that publication Cooper showed his familiarity with the process of saturating water with carbon dioxide, which art by that time had gained wide popularity in the Pennsylvania metropolis.

He had seen an apparatus for carbonating water, developed by Professor Robert Patterson and Joseph Cloud,⁵ in operation at the United States Mint, according to his report. He then tried to make one himself, but could not get it to function satisfactorily. Previously Cooper had described the Cloud apparatus in an appendix to the 1814 edition of Accum's book on a *System of Theoretical and Practical Chemistry*,⁶ which he edited, as follows:

In the common machines for making seltzer water, the gas is strongly forced into the water by being pumped out of the reservoir where it is collected and forced into the water in a very strong copper vessel closed by a valve, by means of a condensing pump. Mr. Cloud of the Mint, has ascertained, that if a common keg or barrel be made perfectly air tight, strongly bound with wooden or iron hoops, having a shelf about two-thirds of its height from the bottom, and filled nearly up to the shelf with water, this water may be very highly charged with carbonic acid gas by means of diluted vitriolic acid and chalk in sufficient quantity placed on the shelf in proper vessels. The head must fit very tight and be very strongly secured, otherwise it will be forced off. The gas is extricated very fast and being accumulated gives the necessary pressure by its own elasticity.

JAMES CUTBUSH

Cooper's *Emporium of Arts and Sciences* of 1814 included a letter from James Cutbush, giving details of an improvement of the Cloud apparatus developed by Cutbush and his associate Glentworth to strengthen the vessel in which the water was being carbonated. They also proposed to better saturate the water by piping the gas to the bottom of the vessel so it would rise through the water during the absorption process.

In all probability the interest of Cutbush in artificial effervescent waters resulted from his search for material to prepare the section on "Mineral Waters, Artificial" which appeared in his *American Artist's Manual*, published in Philadelphia that same year (1814). But it was entirely within the sphere of his activity.

James Cutbush (1788-1823) was an early Philadelphia chemist and apothecary who published many articles of interest and value upon chemical subjects, beginning in 1808. As early as 1812 he advertised a course of "Evening Lectures in Chemistry" and also "Lectures on Theoretical and Practical Pharmacy, and was professor of chemistry at St. John's College in Philadelphia. During the war of 1812 and the Presidency of James Madison he was appointed Assistant Apothecary General in the U. S. Army. Later he became the Apothecary General of the Army, the last to hold that post, and served as a professor of chemistry at the United States Army College at West Point. In the latter post Cutbush specialized in the chemistry of explosives and pyrotechnics, for which he is principally noted.

George Glentworth, an associate of Cutbush in the carbonation experiments, was one of Philadelphia's newer apothecaries at the time. In the *American Artist's Manual* Cutbush commented on the ease with which natural mineral waters of Europe were being simulated and outlined the nature of several such waters, with their mineral constituents, giving the analysis of each by Bergman as basis for their synthesis.

As to the natural waters of the United States, he said:

Of the mineral waters of the United States, though they are general chalybeate, none except the Ballstown are artificially made. The waters of Saratoga, Bath, Yellow Spring, York, Colestown and others of an inferior note, though resorted to in the summer months, and found beneficial to the invalid, are not prepared artificially as before observed.

Dr. Seaman is quoted by Cutbush on the method of preparing the Ballstown water artificially, using the English type of apparatus of Dr. Nooth. He also included material from Fourcroy's *General System of Chemical Knowledge* on the practicability of reproducing the naturally effervescent mineral waters by synthesis, with the statement—

Since the discoveries of the carbonic acid, and the great variety of saline substances, we have succeeded so well in making accurate analysis of mineral waters, and consequently in re-composing them, that it has given birth to a new art, of no small importance to mankind, being employed as a remedy in a considerable number of diseases . . .

The "soda water" of Cutbush's day, according to his description was "nothing more than four or more grains of soda, contained in a pint or more of water, and saturated with carbonic acid; or by adding a solution of soda, to the aerated waters."

ART DESCRIBED BY CUTBUSH

A rather comprehensive review of the status of the art of making carbonated waters during the first few years of the 1800's is contained in the closing paragraphs of his article on "Artificial Mineral Waters," as follows:

Lately, art has gained much in the imitation of mineral waters, particularly of those which are impregnated with elastic fluids, and are indebted to these for their virtues. By the help of machines, exerting great pressure, water is made to imbibe four, five, or even six times its bulk, of carbonic acid, so that art thus impregnates it, with more than nature does. The same is effected with sulphuretted hydrogen gas, and even with oxygen gas; and there is reason to presume, that by this process will be formed a new materia medica, derived from the properties of elastic fluids.

The saturation of water with carbonic acid gas, may be accomplished in the small way, by means of Priestley's or Nooth's apparatus; but in the large way, no other mode is used than the pressure of a forcing pump.

We shall not attempt a description of the apparatus minutely, as it would be of little or no advantage, and require the assistance of several plates; but generally observe, that the aerated waters, are made by impregnating water with fixed air, and in order to saturate the fluid, to make it absorb several times its bulk of air, the means employed is a forcing pump, which is worked by different contrivances, as a wheel, lever, etc. The quantity of gas to be produced, is to be calculated from the quantity of chalk, marble, or lime-stone employed, always allowing about one part of oil of vitriol, to two parts of the chalk, etc. previously diluting it with water. The gas will be instantly extricated, and is then to be conveyed by a pipe into a vessel, from which it is conducted, and at the same time forced into a copper vessel, tinned inside and containing water, by a forcing pump. When the vessel holding the aerated water is removed, and the necessary pipes affixed; by turning a stop-cock the water will extricate itself with considerable power, producing a sparkling appearance. Although the discharging pipe may be several feet perpendicular, and the vessel itself not holding more than 16 or 20 gallons, yet the effect is such, that nearly all the water will ascend the pipe, owing to the great pressure of the gas, and the exertion it makes to obtain an equilibrium. These remarks, therefore, on the manufacture generally of mineral waters, however, imperfect they may appear, and however confined, may at least be productive of some advantage, and especially lead to more correct formulae than heretofore adopted, by some of the fabricators of these waters. We may however state, that so far from following any given rule, some of the manufacturers merely add the particular substance, (as soda in solution) to water saturated with the gas, without observing an uniformity, and so frequently, of other waters, which they would imitate.

SOUTHERN EXPERIMENTERS

Shortly after the Revolution the city of Charleston, South Carolina, produced two figures whose interest in carbonated waters may well be considered as background material for the later development of an industry which was to become one of the most important of the South.

In 1797 Joseph Johnson (1776-1862), of Charleston, obtained his Doctor of Medicine degree from the University of Pennsylvania, no doubt studying under Dr. Benjamin Rush. That he also was impressed with the interest then current in the artificial preparation of effervescent mineral waters is apparent from the nature of his dissertation for the doctorate which was entitled "An experimental Inquiry into the Properties of Carbonic Acid Gas or Fixed Air."

Upon his return to South Carolina Dr. Johnson bought, in partnership with Dunlop, the drug and apothecary business of Dr. Elisha Poinsett, in Charleston. Later he became president of the Medical Society of South Carolina (1808-1809) and was active in its affairs and in its contacts with similar groups in other States.

The other Charleston notable, from the standpoint of early development of carbonated waters in the United States was Charles D. Simons. Simons, jointly with Jean J. Riondel, in 1810 obtained a patent for a method of "saturating water with carbonic acid gas, or fixed air." In this field, only by the patent of Joseph Hawkins, of Baltimore and later Philadelphia, which was issued in 1809 on the preparation of imitation mineral waters, was the Simons and Riondel patent preceded. Details regarding the exact nature of these early patents are not available from official sources, due to the destruction of the Patent Office by fire in 1836, nor is any reference to them to be

found in the scientific or trade literature. Riondel, also, appears to have escaped the permanence of historical record.

However, Charles D. Simons (1786-1812), was born in Beaufort, South Carolina, in 1786. His mother having died when he was an infant, he was reared in the Charleston home of his mother's brother and sister, Robert Dewar and Mary Dewar (Mrs. Robert) Moncreiff.⁷

Although he was short-lived, Simons made rapid progress in his chosen field of chemistry. His obituary reports—"The strong bent of his genius was in the science of nature and the development of her powers in the formation of things . . . Having procured at much expense a proper apparatus, he formed a society of his young friends, to whom it was his habit to reveal the treasures of his laborious industry, and whom he encouraged in the paths of virtue, by the example of his own honorable spirit . . ."

In May, 1811, at the age of 25, Simons was elected to fill the new chair of chemistry and natural philosophy at the South Carolina College, at Columbia. In January, 1812, returning from Columbia to Charleston on horse-back, both he and his negro servant were drowned while crossing a causeway which was covered by water from a freshet in the Congaree River near Columbia.



The Glass Blower

5

Industry Beginnings in America

SILLIMAN AND HAWKINS

The interest which prevailed in the beneficial values of the natural spring waters, previously outlined, had much to do with the beginnings of their synthesis for every-day use in America, as in Europe. Duplication of their effervescence, by impregnation of waters with the "fixed air," was a special point of attention. To many it was their most intriguing and attractive feature. And with the new Republic's scientific endeavors largely centering in its two principal cities—Philadelphia and New York—the potential commercial advantages of making those effervescent waters available to the large population of each metropolis were soon recognized, for it was in those two cities, and in New Haven by Silliman, where they were introduced in the early years of the 1800's.

The commercial sale of soda water began in this country about 1806-1807. Available facts do not establish with certainty who was first, but there is little doubt that both Benjamin Silliman in New Haven and Joseph Hawkins in Philadelphia were so engaged by that latter year. Silliman bottled soda water in 1806, but he made no claim to the activity as a commercial venture until 1807. And the recognition many have long given to the 1807 business of Hawkins in Philadelphia as the first, and his early claim to having introduced the artificially carbonated waters to the American consumer, also have merit.

In 1805, after a year of teaching at Yale, Silliman went to Europe to collect books and apparatus for the new chemistry department he was to head at the college. His opportunity to become familiar with the early stages of that new business in Europe therefore was quite incidental, but while there he did spend time in London and in Edinburgh where methods for the artificial preparation of effervescent mineral waters were well known. In London, at the time, bottled waters were being commercially produced and sold by Paul, Schweppe, and others, as well as at the spas established for their dispensing.

He already knew of such things, for among the items of chemical apparatus with which he began his instruction at Yale, in 1804, was one of the carbonating devices of Nooth. He had become familiar with it while studying in Philadelphia under Woodhouse, and had

met others who were familiar with the European experiments with carbon dioxide, and the effervescence it gave to certain mineral waters.

IN NEW HAVEN

That Silliman did notice the intense interest of the physicians and chemists of England in the effervescent waters, and in their production as articles of trade, is certain. Almost immediately upon his return to New Haven he, also, became active in making them.¹

This was as early as October, 1806 when he wrote to Colonel John Trumbull in New York, requesting bottles in which the latter had imported soda water from London, saying: "Finding it quite impossible with my present means to oblige as many as call upon me for soda water, I have determined to undertake the manufacture of it on the large scale as it is done in London." A little later, in March, 1807 with a Mr. Twining he opened a "soda water concern" at New Haven for the public dispensing of soda water.

Silliman's correspondence with Trumbull also tells of the difficulty he had with defective bottles furnished by the potters "after succeeding perfectly in the construction of a complicated, difficult and expensive apparatus, and after having ascertained by two full trials that it would enable us to manufacture soda water of excellent quality." Details of Silliman's equipment, or the method of their dispensing are not recorded history. However, his establishment has been referred to as one where "the manufacture of mineral waters upon correct chemical principles was undertaken."

IN NEW YORK CITY

The 1809 text of Marcet's *Conversations on Chemistry* states that "an establishment of the same kind, and under the same direction was effected in New York in April of this year," by Noyes Darling & Co. Fountains of Ballston, Soda, and Seltzer waters were opened in the bar of the Tontine Coffee House, located at the corner of Wall and Water Streets. Completed in 1794, it became famous as the gathering place of New York merchants; destroyed by fire early in the 1800's. Of special interest is the description of the system used there:

The cisterns are placed in the cellar, and the waters are conveyed into the bar in block-tin tubes, which pass up into mahogany pillars, crowned with gilt urns, lettered with the names of the respective waters. The pillars, with their urns, stand a foot apart, and the middle one is raised above the others; silver stop-cocks inserted into the sides of the pillars, give the whole much neatness and richness of appearance.

Noyes Darling, who thus appears as another of the pioneers in this new field, was listed as a chemist in the New York directory known as *Longworth's American Almanac* for 1809, with his laboratory at 2 City Hotel. This was one of the newer and more fashionable hotels of the time; erected in 1806, and removed in 1850.

It thus appears that these early American ventures in dispensing the effervescent waters were attempts to duplicate, in a limited way, the type of spas or pump rooms set up for their use in some European centers. The article continues:

The proprietors of this establishment intend, as we understand, to open fountains at the City Hotel, in the month of May, in a spacious room, fitted up and ornamented in a handsome style, and adopted to the accommodation of ladies as well as gentlemen.

The proprietors of the New York Spa at the Tontine Coffee House, Noyes Darling & Co., also bottled their product. Another purveyor in the city, George Usher by name, sold soda waters from the fountain, and in stone bottles, too, during the preceding year (1808). Usher, who was then well established after a year or more of operation, also was listed in the Almanac as a manufacturer of mineral waters, located at 587 Broadway. In 1810 he was deceased, with the business being carried on by his widow, Sophia Usher.

Usher's method of dispensing his product simulated the European idea of setting up spas, in manner similar to that followed at the springs. This is as shown by the following advertisement he inserted in *Longworth's American Almanac* of 1809:

The Mineral Waters manufactured by G. Usher, and same as sold by Hull and Bowne, are to be found likewise for the remainder of the season at the Shakespeare Gallery, No. 11 Park. A Saloon is fitted up for this purpose at Mr. Longworth's with every accommodation, and those who desire to frequent the Fountains in the morning for the benefit of their health will find here the important advantage of the Park for taking the necessary exercise in the intervals of drinking the waters. Papers, pamphlets and novels for Mr. Longworth's store will always lie on the tables in the pump room, so as to combine amusement with utility in this novel and salutary establishment, and render it not only conducive to the health of the city, but an elegant and fashionable lounge for ladies and gentlemen throughout the day. N.B. Orders received for the above waters for exportation.

The firm of Hull and Bowne, druggists, was located at 146 Pearl Street, and was operated by Oliver Hull and Richard M. Bowne.

IN PHILADELPHIA

Whether the method of dispensing followed by Silliman in New Haven in 1807, and at the Tontine Coffee House and elsewhere in New York in 1808-9, was original with the operators of those establishments is not apparent. From what has been recorded, the methods must have been quite similar. And it may be quite coincidental, as so frequently happens when a new art is evolving, that substantially the same system was being claimed as his invention by Joseph Hawkins, of Philadelphia, a year prior to the opening of the New York establishments.

The *Register of the Arts* for May, 1808, published in Philadelphia, made this comment regarding Hawkins:

Mr. Joseph Hawkins, who introduced the manufacturing of these waters into Philadelphia, has made a very important improvement in the process. The mineral water by machinery of his contrivance, and for which he has obtained letters patent from the government of the United States, is raised from the fountain or reservoir in which it is prepared under ground, through perpendicular wooden columns, which enclose metallick tubes, and by turning a cock at the top of the columns, the water may be drawn without the necessity of bottling. The reservoir being placed under ground, and frigid preparations occasionally made use of, the mineral water is rendered more cool, refreshing and grateful to the taste. The fixed air is likewise better retained in that mode of manufacturing and drinking these waters than in the mode hitherto customary, in which much of this air, which give the waters that lively and in some degree pungent taste so pleasing to

the palate, is suffered to escape both in corking the bottles and drawing the corks when the water is drunk.

The foregoing is apparently in error in referring to the Hawkins device as patented, for while he received the earliest United States patent for preparation of imitation mineral waters, this did not occur until 1809. Later, in 1823, he obtained another patent in the same category. Other than this mere listing of the Hawkins patents, no other official information regarding their nature is available. However, according to other scanty historical data, the equipment used by Hawkins in his Philadelphia venture was an improvement of the process being used by Schweppe, in London.

Hawkins also produced the effervescent waters in bottles, for he offered them for home use or for exportation at the time the above was published in 1808. His Philadelphia business was started in 1807, according to the publication *A History of American Manufactures, 1688 to 1860*, published in Philadelphia in 1861. The editor, J. Leander Bishop, chief of the Division of Statistics of Manufactures in the U. S. Census Office, is authority for the statement—

The manufacture of artificial carbonated waters was, about this time (1807), first introduced into this country, at Philadelphia, by Mr. Joseph Hawkins. With patent machinery of his own invention, and an improvement upon the process employed abroad, the business was first commenced by Cohen & Hawkins, at 38 Chestnut Street, and soon after more extensively by Shaw & Hawkins at 98 Chestnut St., the latter furnishing capital for the business. Abraham H. Cohen established a separate business at 31 South Second Street.

These parties obtained testimonials from the most respectable physicians and chemists of the city as to the purity and healthfulness of the waters made by them, which contained three and a half times the quantity of carbonic acid gas found in any natural springs. Artificial seltzer, soda, Pyrmont and Ballston waters were supplied by them at six cents the glass, and from one to two dollars per dozen bottles, according to size; and from the fountain, to subscribers, at \$1.50 per month, or four dollars per quarter, for one glass daily.

While the foregoing assertion regarding the "first introduction" of carbonated waters in America by Hawkins may be open to some question, in view of the extent to which they were previously known and described by physicians and other American scientists, certain it is that Hawkins took an early interest in the newly developed commercial aspects of the novel product.

How long Hawkins continued in the mineral water business in Philadelphia is not a matter of record. When his first patent was issued in 1809 he was listed as a resident of Baltimore. The 1810 directory for Baltimore City shows him as a resident of 11 South Calvert Street. His 1823 patent was issued to him in Philadelphia.

The interest of Cohen, first partner of Hawkins, in the carbonated water business, likewise appears to have been of short duration. He is listed in the Philadelphia directories for 1809, 1810, and 1811 as a manufacturer of artificial mineral water, at 100 South Second Street, but not thereafter.

Peculiarly enough, there is no indication of record that Hawkins or his associates were pharmacists or in the drug business in Philadelphia during the short period of this activity. The importance of their contribution to the commercial development of bottled carbonated

waters, therefore, may well be limited to its early data and the historical interest which it provides.

THE APOTHECARY SHOP TAKES OVER

That the spa or pump-room style of dispensing Soda Water, or the other medicated effervescent waters of those early days, lasted for any length of time seems doubtful. The health values attached to the waters, the prominence of the pharmacist in his community, and the increasing numbers of apothecary shops, seem certain to have provided competition which it must have been difficult for the spas and the bottlers of the waters to meet.

In any event, records of the early 1800's show little evidence of activity other than the initial efforts previously mentioned, in the commercial preparation and sale of the waters, except by the apothecary, or pharmacist. This he did in his own shop and by means of fountains either imported from Europe or which he devised himself. And for the first half of the new century, at least, the developmental phases of the new industry seem to have been primarily in his hands.

From its commercial aspects, there is room for little doubt that during its early life in trade the soda water product got off to a healthy start. The pharmacist knew the nature of the trade, and as an integral part of American daily life his business field was expanding rapidly. Shortly after the Revolution (in 1785) the population of Philadelphia numbered 40,000, and about twenty drug stores were being operated. New York in 1786 had a population of 23,600, and Kellock's New York directory for that year lists six druggists-apothecaries, one physician-apothecary, and one surgeon-apothecary.

However, fifteen years after the small beginnings of an industry thus recorded the number of such potential outlets had been substantially increased. By 1821 New York had grown to a population totaling 123,000, and with a proportionately larger number of druggists which included such firms and individuals as Schieffelin and Company, John Milhau, Benjamin Quackinbush, Peter B. Brown, Hull and Bowne, J. H. and W. B. Post, James Seaman and Company, and Isaac See.

In Boston, with a population of 43,000, in addition to seven wholesale druggists, there were twenty-three retail drug stores. Philadelphia in 1821 had a population of 137,000 with about 130 drug stores of various types. Boston later was to become an important factor in the soda water trade.

EARLY APOTHECARIES IN PHILADELPHIA²

With the position held by Philadelphia in the early 1800's as the principal metropolis of the new Republic, and with the prominent part taken in matters scientific by its professions, including the druggists and pharmacists, it is not difficult to understand why it became so prominent early among American cities in the commercial manufacture of the artificial effervescent waters. And the background of its pharmacy and the drug trade gave special prominence to that portion of the Quaker City's business life.



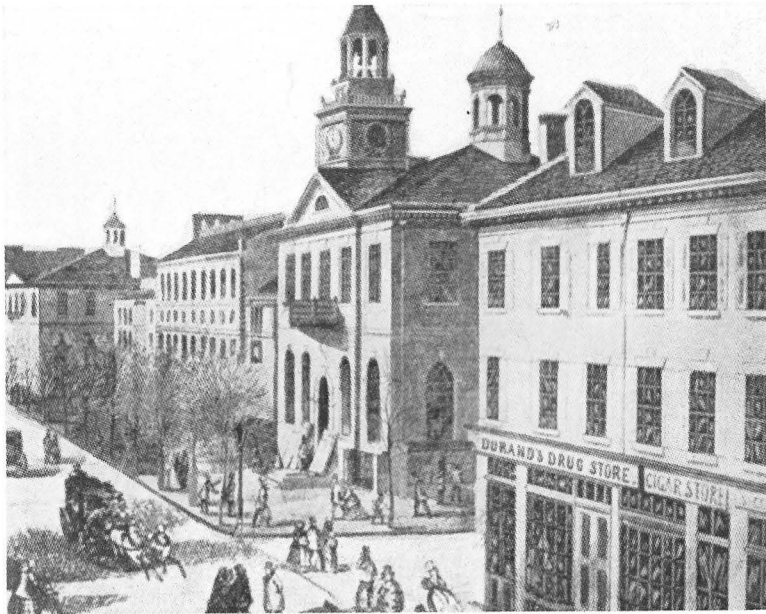
Tontine Coffee House, Wall and Water Streets—About 1800



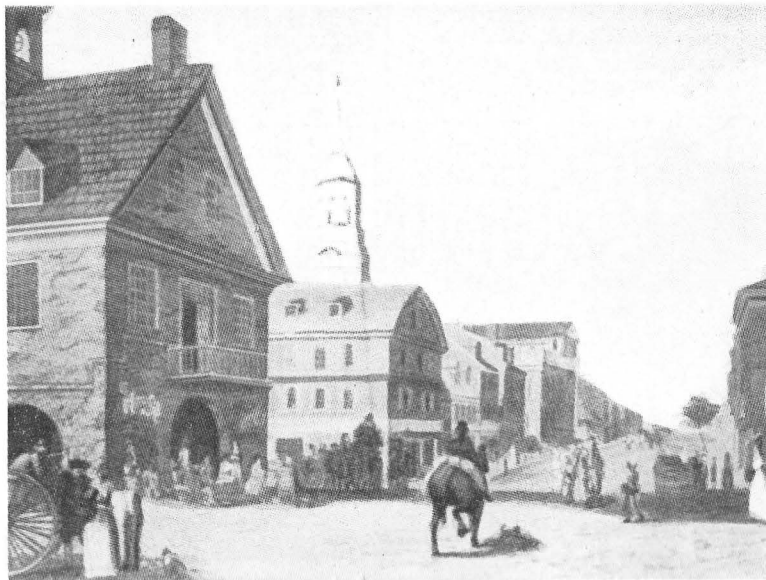
City Hotel, Broadway and Cedar Street—1812

*From Life in America 100 Years Ago., By Gaillard Hunt,
Harper & Brothers (New York, 1914)*

SPAS FOR DISPENSING EFFERVESCENT WATERS IN THESE PUBLIC
PLACES WERE AMONG NEW YORK CITY'S EARLIEST: 1808-1809



Durand's Drug Store, S. W. Cor. Sixth and Chestnut Streets—1825



Speakman and Say, Druggists, Second Street (North) at Market—1812

EARLY SODA WATER FOUNTAINS IN THESE
PHILADELPHIA DRUG STORES

As in other of the larger cities of the colonies, during the early portion of the 1700's stores dealing exclusively in the products of the pharmacist were comparatively few in number in Philadelphia. Evan Jones is recorded as having such a pharmacy there as early as 1730. In nearby Bethlehem an "Apotheke" on the German plan was operated by Dr. Frederick Otto, beginning shortly after 1741. The Philadelphia drug business of Christopher Marshall was started in 1729 and maintained the position as one of the cities leading firms during the succeeding century.

And in events connected with the American Revolution, the importance of pharmacy was recognized, became a vital factor in the success of that movement, and had its centers of activity located in Philadelphia and in the Pennsylvania town of Carlisle, about 100 miles from the city.

In July, 1775, the Continental Congress authorized the establishment of an army hospital with a director general, chief physician, surgeons, apothecary, and other officials. Dr. John Morgan (1735-1789), founder of the Medical School of the College of Philadelphia and prominent physician of that city, became the director general of the military hospitals and chief physician of the army in that same year.

In July, 1776, Andrew Craigie (1743-1819) of Massachusetts, was assigned by Morgan to the post of apothecary at one of the military department hospitals. Later, in 1780, when the military medical establishment was reorganized and authority concentrated in one medical staff, with one "Apothecary General," Craigie was appointed to that position by the Congress and held it until the end of the war.

Another of such Revolutionary Army officers was the "Continental Druggist," by Congressional mandate to be located in Philadelphia, and whose business it was to receive and deliver all medicines, instruments, and shop furniture for the benefit of the United States. William Smith, of Pennsylvania, received the appointment to this post.

And at the suggestion of the Apothecary General, Craigie, the principal stores of medical supplies for the army were prepared and compounded at the shop of the Apothecary General located at Carlisle. From there the chests of medicines were provided for the hospitals and regiments—that is, those which were not captured from British stocks or brought in through the blockade.

With the Revolution successful, the Confederation a thing of the past, and the new Federal Government firmly established, the dawn of the new century brought with it the period during which can be traced more of the background of the carbonated beverage industry in America, with Philadelphia as the primary situs.

GLENTWORTH AND DURAND

George Glentworth, who opened his drug store in Philadelphia in 1812, at the northeast corner of Sassafras (now Race) and Chester Streets, is recorded as one of the Philadelphia pharmacists to show earliest interest in the new art and trade.³ Very probably there were

others, but this feature of their work, since it could not have been of very much importance in comparison to the pharmacists' regular duties, has not been chronicled.

Its experimental nature, also, may have been a factor contributing to its incidental nature and the absence of historical record. The interest of Glentworth, for example, was in the development of an improvement in the crude carbonating apparatus of Cloud and Patterson. Glentworth's associate in this work was James Cutbush, referred to previously.

In 1821, Glentworth became one of the founders of the Philadelphia College of Pharmacy. His drug business continued in operation in Philadelphia for over ninety-two years, being operated after his death by the Glentworth family without any material change in its early arrangement. Its furniture and fixtures were then presented to the College which he helped to organize, where they form an exhibit.

Elias Durand (1794-1873) famous Philadelphia pharmacist, was another of the early makers of artificial mineral waters in that city. Concerning his activity there is more information.

Durand emigrated from France to America following the downfall of Napoleon, having served as pharmacien in the Pharmaceutical Department of the French Army, and arrived in New York in 1816. After periods of activity in his profession in New York, Philadelphia, and Baltimore, he opened his own pharmacy in Philadelphia in 1825, at Sixth and Chestnut Streets.

Of Durand, says the history of the Philadelphia College of Pharmacy—

In 1825, he returned to Philadelphia . . . and opened a drug store, fitting it up at a considerable expense, using French glassware, porcelain jars, mahogany drawers, marble counters, etc. It was quite the handsomest drug store in the Quaker City, and he had many novelties in drugs and chemicals and an apparatus for making and vending carbonic acid water.

In 1835 Durand first introduced the bottling of mineral water, opening a large establishment on Sixth Street above Arch. The apparatus, especially that part of it for bottling under pressure, was of his own invention, and superior to any used in France. Later, he sent it to the Societe de Pharmacie, and it was adopted for use in Paris

Many of the finer medicinal chemicals were made in this country first by Durand, which gave him prestige, and his great skill as a pharmacist, his untiring industry, close attention to business and social and scientific qualities, attracted the most eminent physicians to his store . . .

During the half-century which followed Durand's sale of carbonated waters in 1825, discontinued about 1837, he took an active part in the professional and scientific life of his adopted city. Active as an officer of the Philadelphia College of Pharmacy for many years, he was one of its representatives who assisted in the 1840 revision of the U. S. Pharmacopoeia, and also contributed many articles to the *American Journal of Pharmacy*. His writings on botany, in which subject he became deeply interested, were extensive, and he devoted much time to the activities of the American Philosophical Society, the Academy of Natural Sciences, and other scientific societies.

OTHER PHILADELPHIA PIONEERS

With the impetus given to the dispensing of carbonated waters by Durand at his new store of 1825 with his novel fountain apparatus, others soon followed his lead. Within a few years, the sale of effervescent waters was quite commonplace, and was considered an added attraction to the druggist's business. For example, the following is an advertisement which appeared in the August 5, 1826 issue of *Poulson's Advertiser*:

For sale, the Drug and Apothecary store at the southwest corner of Fourth and Race Streets with mineral water fixtures in excellent order. At moderate expense it affords an opportunity to any one wishing to embark in this line of business, the advertiser going into another pursuit. The store has secured the confidence of several physicians of standing in the city and country . . .

Smith and Hodgson, also, were among those who found the mineral water fountain an added means of attracting customers to their Philadelphia drug store. William J. Jenks, in writing on his recollections of their store during the 1837-1845 period when he served his apprenticeship there, referred to this activity:

Smith and Hodgson were among the first to manufacture mineral water (as it was then called), and their store was rendered very popular on this account. They had a number of copper tanks lined with tin to hold the water, and an apparatus for generating the carbonic acid gas from marble dust and sulphuric acid; this being necessary, as there were no establishments for making mineral water. Syrups were made from the fruit by expression in a hand press.

From this historical reference to the use of flavoring syrups by Smith and Hodgson, it would appear that it was something of a novelty at the time. The business was started in 1828, and after 1849 was known as Bullock and Crenshaw.

The Speakman name appears frequently in the annals of early pharmacy in Philadelphia, covering a period from the opening of an apothecary shop in 1771 by Townsend Speakman (1743-1793), to the later separate business of his nephew John Speakman and the firm of Speakman and Say, in the earlier years of the new century. Westcott's *History of Philadelphia* credits the first making of artificial mineral waters in that city to John Hart, at the suggestion of Dr. Philip Syng Physick, between 1800 and 1810. Hart was the apprentice of Townsend Speakman, and his successor in operation of the original Speakman shop at 8 South Second Street.⁴

Although definite record is lacking, it may be assumed that the prominence of the Speakman and Say firm was reason for the dispensing of mineral waters, also, during those years at their apothecary shop on the northwest corner of Second and Market Streets. Others in their trade were doing it. More definite, however, is the recorded fact that it was in the room above this store that, at John Speakman's suggestion, the Academy of Natural Sciences was founded in 1812. The firm later became Thatcher and Thompson.⁵

SODA WATER POWDERS

In Philadelphia, during that same period, a novel development in mineral water making was taking place—the preparation of powders for that purpose.⁶ Among those engaged in this trade were Henry

Troth and George W. Carpenter, both of whom are prominent figures in the city's annals of pharmacy.

Henry Troth & Company were in business from 1815 to 1842, and among their products advertised "Carbonated Sodaic Powders for Making Soda Water" with the instructions "Dissolve one of the powders contained in the white and blue papers in separate tumblers with about one gill of water in each; mix and drink immediately."

Another Philadelphia product of the period was "Farr's Soda Powder" for making soda water. A Cincinnati advertisement of 1819 offered the powders for sale, out of a consignment received from the Quaker City, together with "Milnor's Acid Lemon" for making lemonade. Farr and Kunzi, makers of the soda powders, were among the earliest of Philadelphia's manufacturing chemists, starting in 1818, and later developing into the business of Powers and Weightman. This firm later made soda water flavorings for the trade.

Also a little later, appeared "Carpenter's Saratoga Powders, for making Congress Spring or Saratoga Waters." Carpenter's activity is outlined in an item, inserted "by request," which appeared in the 1829 volume of Silliman's American Journal of Science.

Carpenter learned the drug business in the Marshall drug store, became an associate of the Academy of Natural Sciences, and in 1828 opened his own business at 301 Market Street, with which he had unusual success. W. E. Henszey became his partner in 1842, in the firm of Carpenter and Henszey.

FEW BOTTLERS IN EARLY YEARS

Bottling of the manufactured effervescent waters, started in America about 1807 by Silliman in New Haven, by the Hawkins firm in Philadelphia, and the incidental mention of similar bottled products marketed in New York City shortly thereafter, are the beginnings of a record which is far from continuous. There is a gap of more than two decades, in which reports of similar bottling activities are virtually nonexistent.

An explanation may be in the prominence which the bottled waters imported from Europe had acquired in the larger cities, which were also seaports. Silliman, at first, found the imported bottles, when emptied, to be a source of supply he badly needed. And then the waters of the domestic springs were in their hey day.

Saratoga Springs was one of the many watering places which had become popular as health resorts, from Poland Springs in Maine to White Sulphur Springs in western Virginia.

Stone's history of Saratoga tells us that in 1826 John Clarke purchased the area including the Congress Spring there, and started bottling the water for exportation. The plant, according to another report, was "a huge structure much resembling a giant shower bath," in which a man and a boy were kept busy filling and corking the output of 1200 bottles a day. By 1828 his firm, Lynch & Clarke, were bottling large quantities and sending it to distant points in the seaboard States; American packets and river steamers were supplied with

it in abundance. Clarke, incidentally, is reported to have previously operated a soda fountain, which he opened in 1819, in New York City.⁷

As previously mentioned in this Chapter, it was about 1835 that the Philadelphia pharmacist Durand, opened his bottling shop in Philadelphia, for making of the artificial effervescent waters.

He soon had competition, and with a variation. Eugene Roussel, is sometimes mentioned as having bottled flavored soda water in Philadelphia about 1838 or 1839.⁸ According to this account Roussel, also French, kept a perfumery shop, where he dispensed artificial mineral water, and started bottling it with lemon flavor. Some of it he shipped to John Tweddle, in New York City.

Tweddle, A. W. Rapp, and Thomas Newton, are also named as Philadelphians who went to New York and opened bottling shops there later, in 1843.

Meanwhile, of course, there were other early developments in the metropolis on Manhattan, and notably that of John Matthews to be outlined in a later Chapter.



The "Kneer" Bottler

6

Early Years of the Soda Fountain

INDUSTRIAL PROGRESS WAS SLOW

In the early days of the American economy, and through the period of the Revolution, the country was devoted primarily to agriculture, with manufactures in a relatively unimportant role. Even in the days following the birth of the republic, wide differences of opinion existed as to any need for changing that condition, and there were other factors which impeded change.

Following American independence constant friction with England and France developed, for one thing, from the rapid growth in American shipping. It increased to a point where our merchant marine was second only to England's. That was one of the causes of the War of 1812.

The economic historian tells us that American capital went into that shipping, and into development of the country's westward expansion, rather than into manufactures. Scarcity of labor, too, is mentioned as one of the deterrents. But while the War of 1812 caused a temporary setback to our foreign commerce, it gave an impetus to manufacturing which introduced the industrial revolution into America.

England, of course, had a half-century start in factory production. The industrial revolution there had been hastened by introduction of the improved steam engine by Watts in 1769, and the expiration of his patent on it in 1800. But more small factories were started in America early in the 1800's, and their numbers grew rapidly during the 1807-1815 period. However, some of that impetus to the growth of manufactures was checked by termination of the War, and its revival suffered setbacks from the panics and depressions of 1819 and 1837. Recovery came in the 1840's, and was greatly encouraged by the improvements in the refining of metals which came rapidly after 1850. Iron, and some copper, lead, and steel had been used in American manufacturing for many years, but new and stronger metals were required to meet the needs of the industrial revolution, and in greater volume to satisfy the demands of the growing population. Bessemer steel was first made in quantity about 1867, as one example.

Historians of our economy separate development of its industrial progress into two periods—1796 to 1860 being the period of early development and set-backs, and the years after 1860 which brought greatly accelerated stimulation coming from the requirements of the

Civil War, discovery of more natural resources, and new manufacturing processes.

With this brief summary, and with the relatively minor place a novel product like soda water held in those hectic years of a new fast-growing nation, it becomes less difficult to understand the long delay in greater use of factory methods in the development of that product.

FIRST PATENTEES

A Digest of Patents issued by the United States from 1790 to January 1, 1839 shows that Joseph Hawkins, of Baltimore, was the first patentee in this field, for on September 7, 1809 a patent was issued to him for preparing artificial mineral water. A few years later, on April 5, 1823, another patent was issued to Joseph Hawkins, then of Philadelphia, for the "giving of temperature to mineral water." No further details concerning either are available, but the nature of the device described in the 1808 *Register of the Arts* and the cooling method he used, do seem to associate it with the patent issued to Hawkins in 1823. Presumably, therefore, both patents were issued to the same person.

The 1809 patent to Hawkins, however, was soon followed by another in the mineral water field which is more readily identified by the description given it. It was for "Saturating water with carbonic acid gas, or fixed air, etc.," issued on August 16, 1810 to Charles D. Simons and Jean J. Riondel, of Charleston, South Carolina. No further details are available for this one, either. The Simons and Riondel patent is frequently referred to as the first U.S. patent for artificial carbonation of water, very likely due to the meager descriptive record of the Hawkins patent.

Probably because of the extent of the apparatus required for methods such as that of Hawkins, as well as operating difficulties, or the need for reaching a more numerous clientele, efforts of those interested in the preparation and dispensing of the waters were soon being directed toward providing simpler and therefore less costly equipment. Obviously they saw the need for something which could be used in the small apothecary shop, or other type of store, in any community. A setup such as that at the Tontine Coffee House, in New York, for instance, would not suit that purpose.

THE COUNTER CARBONATOR-DISPENSER

Development of a counter type of device, for preparation of the carbonated waters and their dispensing, was one answer, and numerous attempts were made in that direction. Those attempts seem to fall into categories illustrative of two schools of thought on how this might best be accomplished in a practicable manner.

One of them embodied the early method of producing the soda water by direct mixture of an acidulant (such as tartaric acid) and an alkali (such as supercarbonate of soda). The other was based upon a procedure which was already common in the European trade, of gen-

erating the carbonic acid gas in a separate vessel, whence it was piped to another vessel containing the water to be impregnated by agitation. Unlike the prevalent method in England, however, where the bottle was the container used in trade and the carbonating vessel was an integral part of the whole unit, in America the container of the water to be carbonated was separable, and portable. This was so that after carbonation was completed the vessel could be used as the reservoir for counter dispensing of the contents, by the glass. And very early in the 1800's, perhaps 1819 or before, such vessel or tank was called a "fountain."

The *Journal of the Franklin Institute* for 1831 and 1832 (Volume XII and XIII), for instance, comments on six patents issued during 1831 for the making of soda water by the mixing of tartaric acid and soda.¹ The counter type of fountain of Ambler is illustrative of these. The device of Ambler is the only early one of which a drawing is available, but it appears to conform generally to the others there described. Consisting primarily of a dual-section tank, the soda and the acidulant were mixed as drawn off, by the connection of each tank with the dispensing faucet.

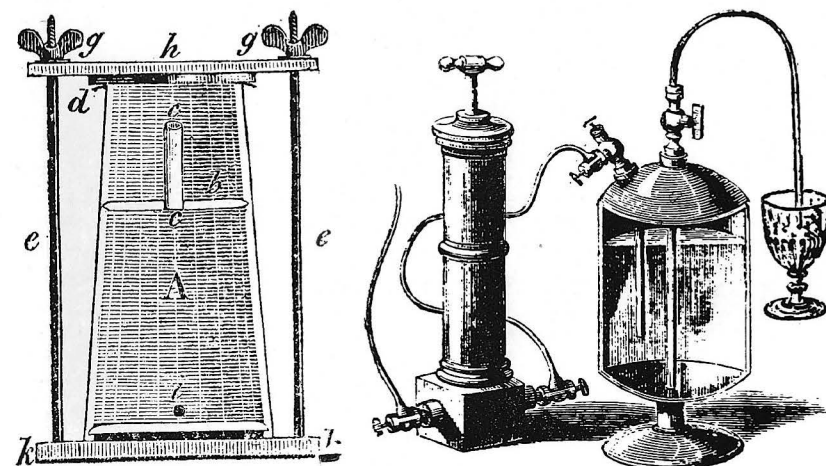
This simultaneous direction of inventive effort toward such a simple objective was basis for caustic comment by the editor of the *Franklin Institute* journal that "If the security of a patent depends upon the number of persons who obtain it under the character of being the true and original inventors, the present is perfectly safe, as it now has no fewer than five guardians."

The 1824 patent of Laning for charging liquids with gas, and the 1832 patent of Boston for a Seidletz or Rochelle mineral water, may be put in the same classification as the foregoing. Boston also patented a "soda fountain" in 1836. But a change was in progress.²

Patent records a few years later show the 1838 fountain of Swan, and the 1839 device of White, to be in the same general category. The Swan method was slightly different, however, in that the water was first mixed with soda, pumped into a cooling tank under pressure, and then dispensed into a drinking glass containing the syrup and acidulant. Thus the effervescence was caused to occur in the glass just before drinking.³

The purpose of these general styles of counter units obviously was to avoid any need for mechanical equipment, and that objective persisted for many years. As late as 1853, a similar counter unit invented by Alexander Frankenberg, of Columbus, Ohio, was described as one for use on steamboats and in country drug stores where the force pump and the gas generator were impracticable.⁴

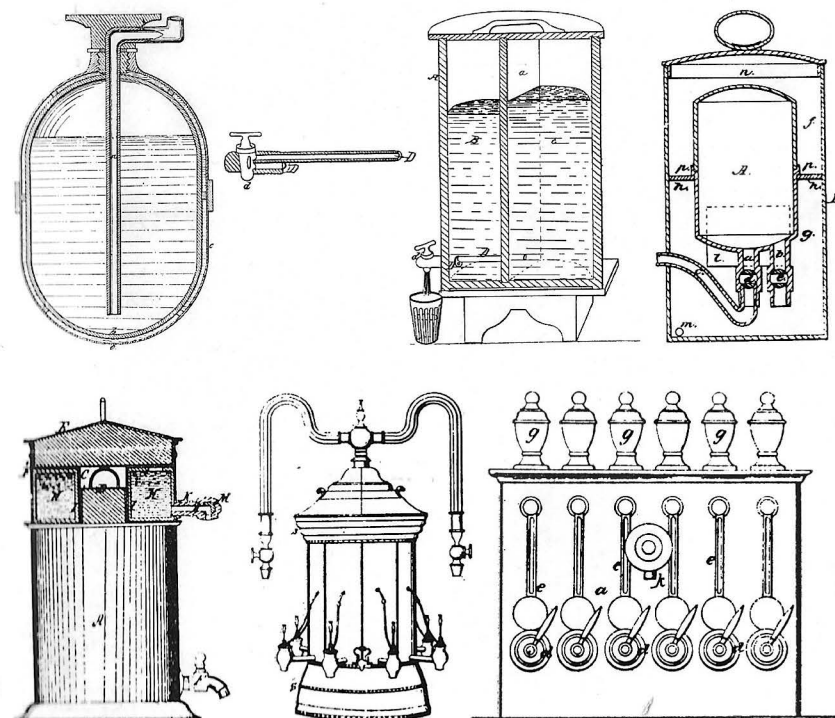
Even though this type of self-contained gas generator and fountain later disappeared from the American scene, it was not before serious efforts were made to adapt the combination of those two functions into larger units for more general use. One of the first of these was an invention of James R. Nichols, of Haverhill, Mass., patented in 1854.⁵



Cutbush and Glentworth—1814.

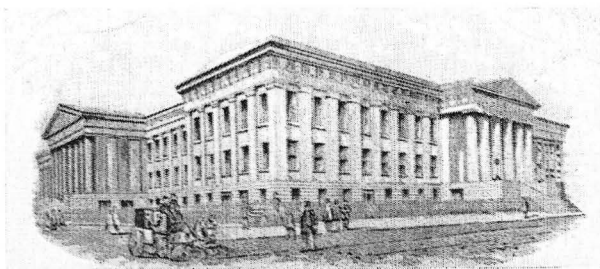
Hare Apparatus—1825.

EXPERIMENTAL CARBONATORS

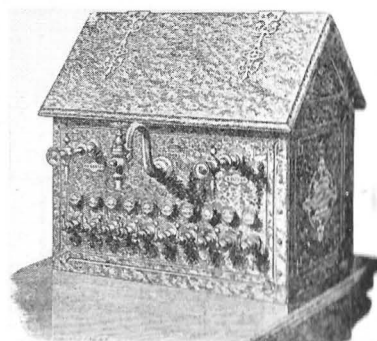
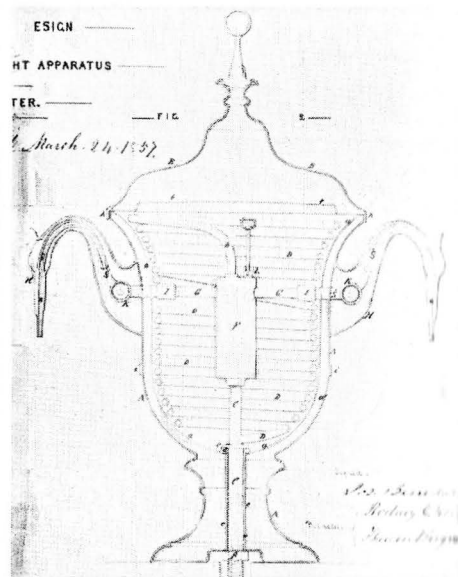
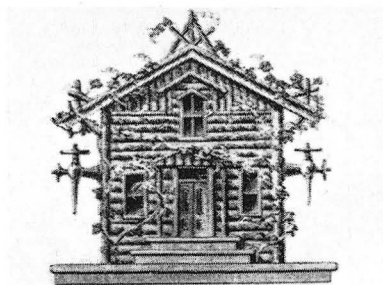
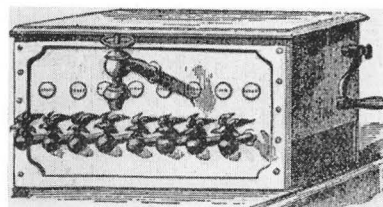
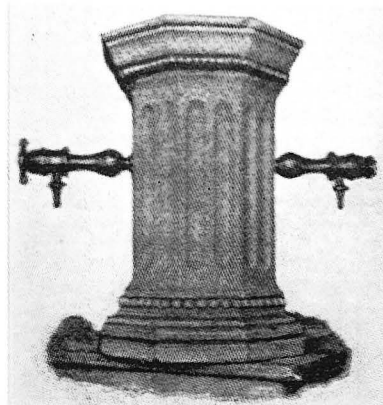


Counter-Fountain Patents (Fahnestock—1819; Ambler—1831; Frankenberg—1853; Coughlan—1853; Bigelow—1859; Morse—1869).

EARLY AMERICAN CARBONATORS AND FOUNTAINS



UNITED STATES PATENT OFFICE—1874

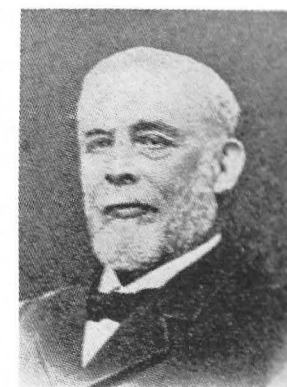


Early Soda Fountain. First Marble Fountain (Dows—1859). First Soda Fountain Design Patented (Bernhard—1857). Fountain Design Patent (Charles E. Hires—1880). Early "Cottage" Fountain (Tufts—1869).

EARLY AMERICAN SODA FOUNTAIN DESIGNS



John Matthews (Senior)



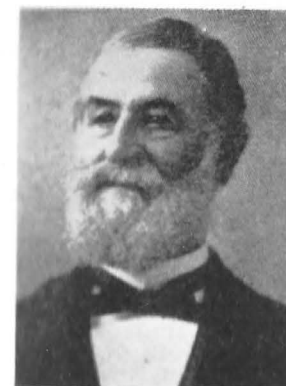
Alvin D. Puffer
1819-1906



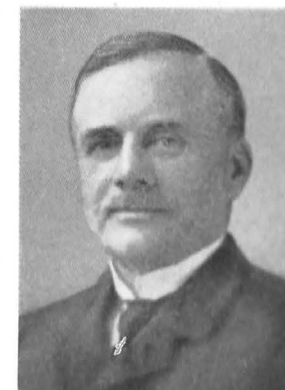
Gustavus D. Dows
B. 1828



James W. Tufts
1835-1902



Charles Lippincott



Selden Twitchell
1841-1917

SODA WATER EQUIPMENT MAKERS OF THE 1800'S

THE FOUNTAIN DISPENSER

It is unfortunate that history has not recorded for us the details of the carbonating apparatus used by Hawkins in Philadelphia, or by Silliman in New Haven, in their early preparation of soda water. In his early writings on preparation of the effervescent waters Silliman did point out, however, that the glass apparatus used by Nooth and Priestley was unsuitable and unsafe for production of the waters in quantity. He suggested, instead, such apparatus as that devised by Dr. Robert Hare about 1823 and used by him in demonstrating the carbonating process to his students at the medical school of the University of Pennsylvania.

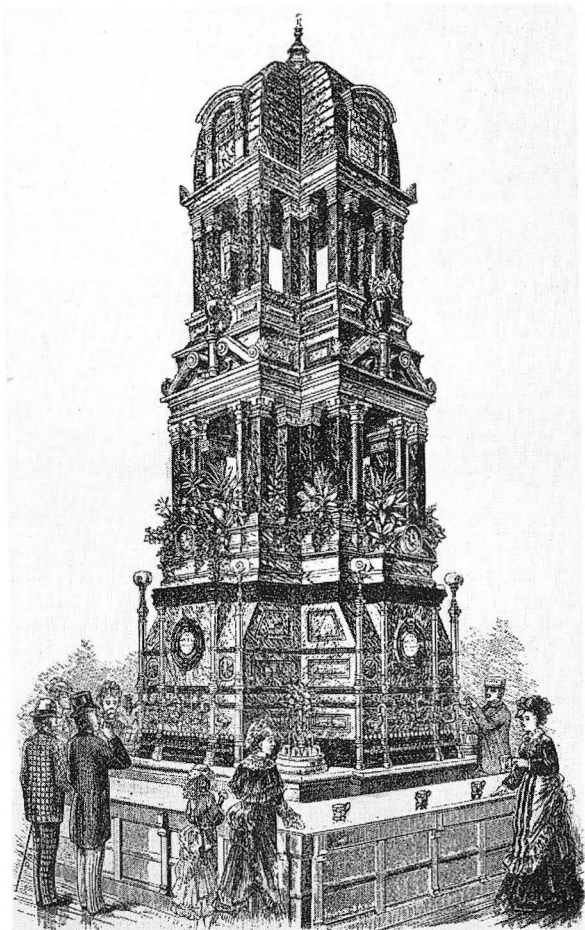
This device, illustrated by Silliman in the 1830-1 edition of his *Elements of Chemistry*, included a forcing pump and a carbonating chamber made of metal; the soda water was drawn from the latter by an outlet valve and tube. While obviously for experimental rather than for commercial use, the Hare device was an early example of the developments taking place in early apparatus for manufacture of the carbonated waters in America.

The earliest U.S. patent relating to soda water apparatus, for which an illustration is now available, is that issued to Samuel Fahnestock, of Lancaster, Pa., in 1819. It shows the type of portable tank, or fountain for containing the carbonated water to be dispensed. The novelty of the Fahnestock fountain was in use of an earthenware lining to avoid metallic contamination of the soda water in it. It was Fahnestock's purpose to solve the chemical problem even then existing, when carbonic acid gas was held in the type of copper-tinned vessel being used.⁶

The use of the tank type of "fountain" continued through the succeeding years as normal practice. As an example, William Coughlan, one of the earliest soda water manufacturers of Baltimore, invented and patented a counter-type of soda fountain 1853, which well illustrates the progress then being made in the compounding and dispensing of soda water. In addition to its inlet-outlet valve the fountain reservoir containing the carbonated water was fitted also with a snift valve to facilitate its filling with the water and gas prior to the agitation, or rocking, the carbonating process. Then the fountain, a portable one, was placed in an outer vessel which also provided space to pack ice as the refrigerant. With dispensing-faucet connections, this constituted the counter unit.⁷

The earlier popular types of fountain dispensers were typified by counter draft arms connected with the soda water tank, concealed and cooled below the counter. For example, the dispensing apparatus early used by John Matthews, in New York City, was a simple draft tube projecting above the counter, and connecting the portable fountain below; the latter was encased in ice. Later a small coil of pipe in a crude ice-box was used for cooling the water during its passage to the counter faucet.

Dispensing glasses were kept on the counter, with a small selection of bottled syrups for filling the preference of the customer. Later the



TUFTS SODA FOUNTAIN AT CENTENNIAL EXPOSITION
PHILADELPHIA—1876

syrup bottles were mounted in a caster, or inverted in rings on a marble slab, with a valve in each bottle for releasing the syrup into the glass before it was filled from the fountain.⁸

FIRST SODA FOUNTAINS

Advertisements in the *American Druggists' Circular and Chemical Gazette* of April, 1860, give some hint of the progress being made in the handling of syrups at the counter dispensers, or soda fountains of that time. An advertisement of Joseph Hindermeyer, of Philadelphia, offered his "Draught Cooling and Syruping Apparatus for Soda Water," which was a large urn shaped vessel of "Britannia Metal," heavily plated with silver. A series of syrup cans was inside. Each had its own faucet, a row of them extending across the front of the urn near its base. An inside ice chamber, through which the carbonated water passed in a coil of block tin pipe, served to cool both the soda water and the syrups.

The Hindermeyer fountain advertised in 1860 was an improvement of an invention of Joseph Bernhard, also of Philadelphia, and on which in 1857 he was issued what appears as the first design patent on a soda fountain. However, the Bernhard fountain had no syrup arrangements, and was entirely for cooling and dispensing soda or mineral waters.⁹

Whether the Bernhard-Hindermeyer soda fountain was ever widely used is not a matter of record, but it is illustrative of the progress in developing new types of counter-dispensing apparatus. And many more were coming.

The same 1860 source shows an advertisement of Wood & Nichols, of New York City, who were selling as one of their items "Bigelow's Syrup Castors and Combination Draught Apparatus." Edmund Bigelow, of Springfield, Mass., was in the field with another and new type of combination syrup-soda water cooling and dispensing device for counter use.¹⁰

Wood & Nichols also offered soda water apparatus made by Andrew J. Morse, of Boston, who was one of Boston's leading coopersmiths engaged in the manufacture of soda fountain apparatus for several years, although his first patent in that field was not issued until 1864. Among his earliest inventions was a syrup fountain and cooler, for counter use, and glass syrup jars for it.¹¹

The issue of *New Remedies* for August 1877, a magazine of the drug trade, gives this vivid description of the dispensing of soda water at Delatour's, in New York City, in the 1870's:

The importance of these qualities may be illustrated by reference to Delatour's soda water stand in Wall Street, which maintained for many years an extraordinary popularity, though the beverage was dispensed in a way so rude as to be almost picturesque. The fountains were placed in an ice-house and thoroughly refrigerated before charging—the cold water, of course, imbibing the largest amount of gas. Then they were snugly packed with ice in a large tub, as ice cream freezers are packed, and conveyed to the Wall Street store. Reaching there, a "goose-neck" was attached to the fountain, and, without removing it from the ice, its contents were drawn for the customers, scores of whom often stood in a long queue waiting their

turns. The syrups used were extraordinarily thick and rich, and were kept in bottles on ice until they were called for. The trade was limited to the four or five hours of greatest activity in Wall Street, but the business done has, perhaps, never been surpassed, or even equalled, at any other soda water stand in the World.

SOME EARLY CARBONATOR MAKERS

These early versions of the soda fountain were not, of course, the complete story, for dispensing of the product had to be preceded by the very important process of carbonating the water, and that by the making of the carbon dioxide. Since those latter processes are involved in the historical basis of the bottling function, their early development for soda fountain purposes provides some of that background for this narrative.

As the use of the counter dispensers developed, John Matthews, of New York City, and others were perfecting gas generators to provide the important gaseous element. The early Matthews generator was of cast-iron lined with lead, in which the carbonic gas was produced from a mixture of marble dust and sulphuric acid, the latter being fed into the generating chamber from its connecting container. An agitator, rotated by an outside handle on its axle, mixed the acid with the carbonate. The gas produced was purified by passing it through water in a connecting chamber, and then conducted into the containers of cast-iron, lined with tin, which contained the water to be impregnated.

An early form of the Matthews generator and portable soda water apparatus for use in retail stores is one of the items illustrated in the April, 1860 issue of the *American Druggists' Circular and Chemical Gazette*. A simple device, it illustrates the horizontal generator with acid container and gas washing chamber attached, and a connecting portable fountain on its stanchion, or rocker-cradle.

Two types of somewhat similar carbonating devices, or "soda water apparatus," for fountain operators, are also advertised in the same issue by Wood & Nichols. One of these was the invention of James R. Nichols, and another that manufactured by Andrew J. Morse, both mentioned before.

A fourth, and the more advanced in appearance, was one advertised by William Gee, of New York City. The principal differentiating feature of Gee's unit was a stationary horizontal carbonating cylinder, in size and appearance similar to the gas generating cylinder which was part of the unit. It also had a handle, or crank, for rotating the dashers on the shaft inside the tank. By such agitation the gas and water were mixed. Gee advertised his unit as "First Premium Soda Water Apparatus in the United States," and it was priced at \$165 complete.

WILLIAM GEE

During the early days of John Matthews' entrance into the soda water field one of his apprentices was William Gee, of New York City. Gee was an ingenious mechanic who, leaving the employ of Matthews

in 1847, went into business for himself. In 1860 Gee was doing business in the New Haven Railroad Building, at Franklin and Elm Streets, as Wm. Gee & Co.

The ingenuity of Gee in the development of new apparatus to meet the needs of the fountain trade in mineral waters and soda water is shown by the number of devices he patented in his own name between 1855 and 1879.¹²

His inventions included numerous devices relating to generating the gas, for carbonating, and for drawing the carbonated liquids at the soda fountain. He was particularly attentive to the important problem involved in the reaction of the metals used with the acids, and several of his inventions related to the construction and lining of the generators and portable fountains. Other devices of his were concerned with the preparation and use of syrups, the cooling of the soda water for draught, and siphon filling.

One of Gee's inventions combined a force pump with the portable fountain so that it could be refilled against pressure, and thus avoid loss of gas remaining in it. This later became a feature of the Matthews equipment, as did another of Gee's inventions known as the "Monitor Crystal Spa" made of silver plate for syrup cooling and dispensing. That unit became very popular through its use by Huyler, the confectioner, in all of his New York stores. Gee's soda water fountain equipment was also used at the famous spa of Dr. Hanbury Smith, of Union Square in New York City.

Gee was prominent in the soda water equipment field from 1847 until about the late 1870's; when he is reported to have sold out to the firm of John Matthews.

DOWS AND THE MARBLE FOUNTAIN

Gustavus D. Dows (B. 1828) was a retail druggist doing business at Lowell, Mass., associated with his brother Amos W. Dows under the firm name A. W. Dows & Co. The firm was started about 1855, and the novelty and popularity of the soda fountain soon caused it to become their major interest. Their advertising prior to 1860, for instance, included reference to "Iced Cream Soda on Draught." More important here, however, is the interest shown during those same years by Gustavus D. Dows in improving the then relatively simple and uninteresting type of soda fountain apparatus, for he is generally credited with originating the first of the marble soda fountains.¹³

His new fountain, patented in 1861, was a marble box, containing a cooling coil for soda water, metal containers for syrups, and an ice shaver. A block of ice placed in the latter was shaved into snow, to be placed in the drinking glass, the syrup added, and then the soda water. Ornate faucets, silver-plated, for the syrups, gave the fountain distinctive appearance. In his earlier fountain Dows found it necessary to first fill a bottle with the soda water from its draft tube so that the carbonation would not be lost; the water then being poured into the tumbler containing the ice and syrup. This extra operation later

was avoided by his design of a double-stream soda draft tube, which permitted the soda water to be poured directly into the glass without loss of the carbonation.

While Dows also made other improvements on the soda fountain method of dispensing, his early efforts on the marble fountain device is the one which gave him his prominence in the field, for it was widely used in the druggist trade. His factory was in Boston.

In addition, he is credited with being among the first to bottle ginger ale in this country, compounding it from his own formula.

Dows exhibited his fountain apparatus at the Great International Exhibition in Paris in 1877, and was awarded medals and high commendation. A little later he opened a business in London, England, as the firm of Dows, Clark, Van Winkle & Co. for the manufacture and sale of his marble soda fountains.

The Dows business in Boston, and that in London, closed during the 1880's.

ALVIN D. PUFFER

Alvin D. Puffer (1819-1906), of Boston, was another of the earlier manufacturers of soda fountain equipment and bottling plant apparatus, starting in the soda water bottling business about 1842, and going into the manufacture of apparatus ten years later. His firm was A. D. Puffer & Sons, located on Portland Street. While Puffer made some bottling equipment, the principal innovations introduced by the firm during its existence were directed primarily to the soda fountain trade. His catalogue of 1860, illustrated the "Puffer improved and simplified carbonic acid generator," manufactured by the "United Interest Soda Generator and Fountain Company."¹⁴

Puffer, for example, is credited with invention and introduction in 1861 of the "Magic" draft tube for counter fountains. Its novelty was in an ingenious valve connection of the single fountain draft tube, or faucet, with the several syrup receptacles, by which any one of the flavored syrups could be drawn. Previously a separate draft tube for each syrup had been used. Then, when sufficient syrup was in the glass, another operation of the same faucet mechanism disconnected the syrup source and connected with the carbonated water reservoir to complete the drink. At the same time the water flushed the draft line clean of the remaining syrup, and it was ready for the next flavor selection. The novelty of the "Magic" draft arm gave it wide popularity, and it was used by such well-known stores as Hudnut's, located in the Herald Building, in New York City where a total of 3500 glasses of soda water were dispensed on a good day. "Frigid Cream Soda" from "Puffer's Superb Fountain" was widely advertised. Puffer also held patents in several other devices relating to fountain operation.

A. D. Puffer & Sons became prominent in the soda fountain and soda water bottling fields with branches in Chicago and in New York. In 1891 the firm combined with others to organize the American Soda Fountain Company, to be referred to later. However, in 1904 Puffer

withdrew from the consolidation and continued its separate business as the Puffer Manufacturing Company, with offices at Boston and Winchester, Mass. Later, in 1917, the business and assets of the Lippincotts, in Philadelphia, were purchased, and the name of the company change to Puffer-Lippincott Company. Operations were discontinued in 1928.

JAMES W. TUFTS

The introduction of James W. Tufts (1835-1902) into the manufacture of carbonated beverage equipment is explained in his own words in *One Hundred Years of American Commerce* (Vol. II, New York, 1895) as follows:

In 1863, being in need of a soda fountain for use in my drugstore in Somerville, Mass., I invented and patented an apparatus styled the 'Arctic,' which subsequently attained a wide popularity, and led me to abandon the drug business to engage in its manufacture. Although a crude machine judged by modern standards, it was considered to be in advance of any in the market at that date. Its peculiar feature consisted of cylindrical metal coolers, which possessed the advantage of producing soda water of so low a temperature that the use of shaved ice, which had the effect of driving off the gas from soda water drawn upon it, could be dispensed with. The syrup-containers were placed in the rear of the marble box, and connected with the syrup faucets by means of coolers passing beneath the ice, producing chilled syrups . . .

Tufts issued his first catalogue of equipment in 1864; others followed, as late as 1895. In the 1860's the factory was located at 11 Haverhill Street, in Boston, and during those years his fountain equipment was widely used in most of the country's metropolitan areas, in 1200 stores. It was added to the line of other equipment producers, such as Charles Lippincott & Co. of Philadelphia. In 1868 Tufts also had a branch in New York City, at Nassau Street and Maiden Lane.

During the decades which followed, Tufts introduced several changes in his equipment to meet the ever-growing competition. These involved an early revision in the design of the marble counter fountain from the square box to the "cottage style," which he patented (1869). Others included a patented revolving tumbler-washer, and the use of block tin in syrup cans to replace the receptacles of copper, glass, and earthenware previously in use.¹⁵

Tufts was one of the first to feel there was a potential for winter trade in "hot soda-water," and he developed several equipment items in that field, but one of his more important innovations was the drawer type of syrup-can for soda fountains. This was designed for horizontal location below the ice chamber in the fountain, and not only allowed better cooling of the syrups, but was easy to remove for cleansing and refilling. It subsequently became a standard type of container for most counter fountains and was widely copied, with a long record of patent litigation by Tufts to protect his claims to it.

In 1876 Tufts joined with Charles Lippincott & Company in obtaining the exclusive privilege of advertising the soda-fountain and serving soda-water at the Centennial Exposition held in Philadelphia during that year, for which they paid \$50,000. Plans for their main exhibit called for a soda fountain "over thirty feet in height, with an

open interior which can be reached by descending into the cellar and ascending stairs on the inside. The lower story, or section, of the apparatus is devoted to soda water, syrups, ice, etc.; the second story will be occupied by a beautiful fountain, playing perfumed waters, surrounded by rare exotics, ferns and flowers; while the upper story, surrounded by a handsome dome and staff with the banner of 'Arctic Soda' floating therefrom, will be illuminated from the interior by an elegant chandelier. The exterior of the apparatus is constructed of a combination of the most costly silver-plated work of the finest finish, with statues, globes, and every attraction money can command. The transportation of the materials for this fountain alone required nearly 150 large cases."

In addition, of course, the smaller soda-fountains were placed by Tufts and Lippincott in the refreshment stands throughout the grounds. Tufts later said "The business done was enormous, and although not profitable in itself, proved a valuable advertisement."¹⁶

Beginning in 1883 Tufts also produced a line of equipment for bottling plant use, including a special carbonator of his own design. Except for that special item, his bottling plant equipment generally was of the type sold by others in the field. The Tufts firm joined with others in a consolidation in 1891 as the American Soda Fountain Company, and James W. Tufts became a leading figure in the new corporation. He died in 1902.

CHARLES LIPPINCOTT & COMPANY

Charles Lippincott & Company was at the time one of the oldest firms in the business of making soda water apparatus, John Lippincott having started making soda tank fountains about 1835. The firm was directed by Charles Lippincott, from the early sixties until his retirement in 1876. It advertised in a modest way in the soda water trade magazines during the later years of the century as a supplier of bottling and bottle washing units. The bottling plant equipment it sold was of the conventional types, and quite similar to the general style of the equipment of Matthews, Tufts, and others. At times it stressed particular items, such as their steam-jacketed kettles for syrup-making, and portable fountains.

The principal interest of the Lippincott firm was in the soda fountain field, and as the marble fountain gained in popularity as standard equipment in the nation's drug stores the company made it their major item, becoming one of the leading houses in that line.¹⁷

The Lippincott firm is sometimes credited with the manufacture of the first of the front service syrup pump type of soda fountain installations so popular in the twentieth century, which was installed in the Broad Street Station Pharmacy in Philadelphia in 1903. However, several of the fountain arrangements developed many years before by Matthews and Tufts were of this same general nature.

In 1891 the Lippincott organization consolidated with Matthews, Puffer, and Tufts as the American Soda Fountain Company. In 1907 A. H. and F. H. Lippincott withdrew from the group and resumed

business in Philadelphia as Charles Lippincott & Company; changed in 1909 to A. H. & F. H. Lippincott. Ten years later the business was sold to Puffer of Boston and continued as a part of the latter organization.

AMERICAN SODA FOUNTAIN COMPANY

The closing decade of the 1800's gave evidence of changes in the industry which were to come, and this quite obviously had its effect upon the manufacturers and suppliers of soda water equipment. One indication of this is the decision, made early in those years, of four of the major firms in that field to pool their resources as they faced the future.

In 1891 James W. Tufts, A. D. Puffer & Sons, Charles Lippincott & Company, and the John Matthews Apparatus Company, organized the American Soda-Fountain Company, capitalized at \$3,750,000, a New Jersey corporation. The new company purchased the businesses represented by the four old firms and they thus became a single corporate identity, although each continued to conduct its separate business and its advertising under the old firm names. Later the Harrt Manufacturing Company, of Chicago, makers of Carse's Continuous Carbonator, was consolidated with them. The relative magnitude of the new organization quite obviously created a stir in the trade and worried competitors. Robert M. Green Company, the Philadelphia soda fountain manufacturer, for example, soon afterwards was advertising to its customers "Not in the Trust! Bear in mind that we are no wise interested in, or controlled by the American Soda Fountain Co. (Tufts, Puffer, Matthews and Lippincott), and are not required to pay a dividend of 31 per cent on \$3,750,000." Others advertised "Not in the Combine."

The officers of the new corporation were: James W. Tufts the President, Alfred H. Lippincott the 1st Vice-President, John H. Matthews the 2nd Vice-President, and James N. North, of Boston, the Treasurer.

The first year of the new combination was its best one from the standpoint of earnings, which were slightly over \$400,000. Annual profits for somewhat less than that amount were shown through 1895, but operating losses of almost \$150,000 in 1896-8 wiped out all surplus. The report for 1898 explained that "In common with a large proportion of other manufacturing companies the business has been a losing one. This has been due to continued depression in all lines of trade."

A little later the American Soda Fountain Company was advertising itself to the trade as "The Greatest Bottlers' Supply House in the Wide World," with offices at Boston, New York, Philadelphia, Chicago, Baltimore, St. Louis, Denver, San Francisco, Atlanta, Dallas, and Oklahoma City.

Despite a return to profitable operation in 1900 the business had its difficulties. The Puffer organization withdrew in 1904 to resume its separate business. The departure of A. H. and F. H. Lippincott followed in 1907, and they reestablished their own business in Philadelphia.

With some reorganization, the American Soda Fountain Company continued in business with headquarters in Boston, and for several years it dominated the soda fountain equipment trade, but had little connection with the bottling business. In 1929 the assets of the company were purchased by the United Soda Fountain Company, and the name of the latter changed to United-American Soda Fountain Company; and in 1933 to the United-American Soda Fountain Corporation.

SODA FOUNTAINS ENTER A NEW ERA

The preceding discussion of the soda fountain has been directed to features having a connection with the allied phase of bottling the effervescent waters. Obviously it does not present a complete story of the development of the ornate fountains which had such an important place in the corner drug store during the later decades of the 1800's, and the earlier years of the new century.

The evolution of the marble fountains of those early years would provide material for a complete narrative by itself.¹⁸ As mentioned before, The Lippincott, Tufts, Puffer, and Matthews firms, as well as others, devoted much of their business life to its development, manufacture, and promotion. Their catalogues for decades featured the marble fountain; the designs were numerous, and innovations were continuously being introduced.¹⁹

The commercial manufacture of carbon dioxide in liquid form and its availability to the druggist during the later years of the 1800's simplified his soda-fountain operation, of course, since it was no longer necessary for him to generate the gas. Nevertheless, generators and carbonators in sizes suitable for that type of retail operation continued to be manufactured, and many used them as a matter of convenience, and of economy.

The Witteman carbonator, manufactured and sold by Witteman Brothers of New York City, was one of this type and, of course, the older firms in the fountain equipment field continued to supply their units. In many cases the fountain operator reduced the carbonation process to its simplest form—connecting the drum of liquid gas to the soda tank, with pressure regulator, and manually rocking the tank of water until the desired saturation was effected.

The disappearance of the gas generator from the retail soda fountain, of course, was hastened by the more satisfactory use of the liquid gas. While carbonators continued in use to a rather substantial degree, many soda fountain operators found the soda water prepared by the local bottling plants, and contained in the latter's portable tank fountains, relieved them of that burden, and the bottlers' preparation and sale of tanks of soda water to the smaller fountain operators became part of his regular business, and has continued.

The Liquid Carbonic Acid Manufacturing Co. (later Liquid Carbonic Corporation) started making soda fountains in 1897, and was a major producer in that field for several decades. Its manufacture of soda fountain equipment was discontinued in 1952.

In 1908 Bishop-Babcock Company, Cleveland, also started making fountains, and carbonators. The "Iceless" soda fountain was introduced in that same year by L. A. Becker Company of Chicago. In this the low temperature in the brine from the salted ice used to refrigerate the ice-cream, was used to chill the carbonated water for the fountain. The mechanically refrigerated unit was an innovation of a few years later (about 1918). In 1910 the Bishop-Babcock and Becker firms were combined.

The soda fountain manufacturing field, of course, included many others. Among the earliest were The Fischman Company, of Philadelphia (1888), the Haussling Soda Apparatus Manufacturing Co. of Newark (1890; discontinued 1954), and Bastian & Blessing, of Chicago (1908).

Progress in the retail soda-fountain field starting about the turn of the century, therefore, centered largely in the soda fountain unit itself. Most prominent was the change of the fountain to the type of "front service" which has entirely superseded the ornate marble structures of the Mid-Victorian era. And, in addition, the soda fountain of recent decades in the twentieth century no longer has as its primary function the dispensing of soda water. The fast service of prepared foods and other drinks has assumed the position of major importance in its operation.

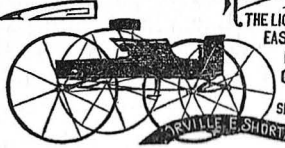
And it was a relatively fertile field for the equipment trades. The earliest census of them (1869) showed 13 engaged in the making of soda water apparatus, principally for soda fountain use, with value of production \$813,000. By 1899 there were 30 such firms, and their annual output was valued in excess of three million dollars. Twenty years later, in 1919, 66 were engaged in trade. Production value exceeded fifteen million dollars and it stayed at this approximate level until World War II.

In 1947, the same number of manufacturers produced equipment valued at thirty-two million dollars.²⁰ Some of this no doubt represented a back-log due to scarcities during the war period.

HIRES' IMPROVED ROOT BEER
 Package, 25c. Makes 5 gallons of a delicious, sparkling, and wholesome beverage. Sold by all Druggists, or sent by mail on receipt of 25c. C. E. Hires, 48 N. Del. Ave., Philadelphia, Pa.

BEFORE YOU BUY A BICYCLE
 Of any kind, send stamp to **GUMP BROS.**, Dayton, Ohio, for large Illustrated Price List of New and Second-Hand Machines. Second-hand BICYCLES taken in exchange. BICYCLES Repaired and Nickel Plated.

A NEW DEPARTURE RUNABOUT WAGON
 THE LIGHTEST, STRONGEST EASIEST RIDING AND BEST WAGON FOR GENERAL USE. YET MADE. SEND FOR CIRCULAR.
 ORVILLE E. SHORT, SYRACUSE, N.Y.



National Advertising—1884
Harper's Weekly

7

A Pioneer in Bottling Equipment

JOHN MATTHEWS

In discussing the history of the American carbonated beverage industry, it is quite impossible to make any clear cut distinction between preparation of the product for the soda fountain and procedures incident to the bottling of it. Similar difficulties exist in an attempt to fairly evaluate the interests of those who were active in both segments of the field during the industry's evolution during the early 1800's.

The activities of such as Gee, Lippincott, Dows, Puffer, Putnam, Tufts, and the several others who made their contributions of inventiveness and mechanical skill, and whose foresight did much to prepare the industry for the period of rapid progress it was to face in the twentieth century, have been previously mentioned. All of them must be fully credited with major contributions to the initial development of the American carbonated beverage industry, including the results of their efforts, directly or indirectly, upon growth of the bottling phase which has become such a vital part of the whole.

The frequent appearance of the John Matthews name in previous chapters, however, gives even more reason for special mention. Early recognition of the possibilities of the bottled product, and greater activity during the latter half of the century in the development of the soda water bottling plant and its business, are typified by the Matthews name.

"NEPTUNE OF THE TRADE"

Several references in the limited literature concerning evolution of the carbonated beverage industry are made to John Matthews as "the father of soda water as it is known in the United States." The *New York Evening Mail* of 1868 (issues of July 27 and July 30) called him "The Neptune of the trade" in telling of his prominence in the soda water industry of that day.

According to that source Matthews learned the art of making artificial mineral waters under the famous Bramah, early maker of mineral water carbonating equipment in England. Coming to New York, there in 1832 he began the manufacture of soda water and the apparatus with which it was prepared. In a few years his son, the junior John Matthews joined him.

The *New York Evening Mail* item of 1868 gives an interesting account of John Matthews, saying that shortly after he entered the

business in 1832 he bought out the rival establishments then being operated by four widows of earlier producers in the metropolis—Mrs. Boston, Mrs. Jones, Mrs. Usher, and Mrs. Anonymous. The item continues "he bought them all out and, aided by a solitary negro, who then carried around in a hand-cart all the soda used in New York laid the foundation of the present immense house."

Sophia Usher was the first female patentee in the soda water field, and widow of George Usher, early mineral water maker in New York City. And Mrs. Boston was very probably the widow of Joseph Boston, another of the early patentees previously referred to, and who was a chemist located at 7 Wall Street. The Matthews business thus started early to show interest in the acquisition of allied businesses—something which was to occur frequently during its lengthy period of operation.

The enterprise of John Matthews, in 1868, was located at 1st Avenue at Twenty-sixth Street, was the largest in the trade, and employed 110 men. There were 45 bottling establishments in the city in that year.

CAPITAL—A MILLION DOLLARS

The relative growth of the Matthews business in the years between his original venture in 1832 and the standing of his business in 1868, mentioned above, gives some indication of the activity which must have gone on during the intervening years. And then, very probably marking the passing of the senior Matthews, in 1869 the business operated as a partnership of the junior John Matthews and his brother George, with another brother, E. Matthews, becoming a member by 1871. The business then became the Firm of John Matthews.

In June, 1877, with obvious reference to the Matthews firm, the drug trade magazine *New Remedies* made this comment—"A single American firm, engaged for two generations in making soda water apparatus, has taken out over one hundred patents, employs a capital of a million dollars and a force of over three hundred workmen, conducts 38 distinct trades in its factory, sends its products to every quarter of the globe, and has sold over twenty thousand apparatuses. Over three-fourths of these, besides thousands made by other manufacturers, have gone into the hands of the druggists of the United States and Canada, and the manufacture and sale of soda water forms an increasingly important part of their business in the warm season."

The general absence of specific trade literature during those early years leaves much to speculation on the nature and timing of new developments prior to the 1860's. Certain it is, however, that in the 1860-1870 decade the Matthews business was doing much to keep in step with progress in the types of carbonating equipment being developed primarily for fountain use by such competitors as Puffer, Gee, Nichols, Morse and others—all of whom were active in the field with new ideas.

And then there was the new marble type of counter fountain of Dows which, early in the 1860's, became popular and was soon to revolutionize the drugstore method of dispensing the sparkling min-

eral waters and flavored soda water. The progress which was made with this innovation in a relatively few years is vividly shown by the fact that by 1876 the Matthews catalogue presented more than a score of different types of the new marble fountains to the druggist portion of the trade.

Other changes were in process, too, and they were assuming importance. New developments in the soda water bottling field were making their appearance, and this spurred the Matthews fraternity into a new cycle of activity.

MATTHEWS (JR.) THE INVENTOR

During his long period of activity the senior John Matthews had no particular interest in making claim to patent protection of any innovation in the soda water field. However, his son John was apprenticed in the Matthews shop, at age 14, and within a few years became a prolific inventor and patentee.

John Matthews, the junior, was born in Chelsea, England, in 1831; died in New York City, in 1883. In 1855, he obtained his first patent, on a pressure gauge for soda water apparatus and steam boilers. In the years that followed the issuance of patents to him was a frequent occurrence, with more than seventy credited to him at the time of his death.¹

While some of his patents had reference to the fountain method of dispensing, the greater number were in the bottling field, clearly showing direction of the firm's interests. Most of his innovations were related directly to bottling methods, bottling devices, bottle washing, closures, syrup dispensing apparatus and other syrup equipment, and cooling devices. And then, of course, there were some for the unusual such as the new steel portable fountain he introduced in 1873, as well as a wagon for carrying them.

John Matthews, junior, associated himself with others in some of the innovations added to the firm's line. In some few instances he joined with them in filing applications for patents as joint inventors. This is particularly true as to his association with Albert Albertson, and with Dr. Peter H. Vander Weyde. The latter, of Philadelphia, seems to have been interested in the medical aspects of soda water, with patents in his own right.² In 1869 Vander Weyde appears as an officer of The Arctic Ice & Refrigeration Company, of New York City. He was prominent in the American Institute, also, and sometimes acted as judge of entries in its exhibit.

Others, of course, very probably disposed of the rights to their inventions to Matthews, for the firm is reputed to have owned a wide range of patents on the equipment it manufactured. William Gee, for example, sold all his rights to the Matthews firm when he retired from the equipment business about 1880. The Bigelow Manufacturing Co. of Springfield, Mass., manufacturers of soda fountain equipment and specializing in the "Wonder" cooler for draught carbonated drink dispensing, was also taken over by Matthews in 1878.

The absence of historical record concerning the mechanical details of equipment produced by Matthews prior to 1860, seems to indicate that previously he was more interested in the sale of artificial mineral waters and soda water, as such, rather than the production of apparatuses. It is well known that the elder Matthews was one of the few in the American trade who retained a long-standing interest in the continuous system of carbonating and bottling favored in Europe and identified with Bramah, with whom Matthews had served before coming to this country. And that interest may account for the early appearance of the Matthews continuous system as one unit of the firm's equipment advertised to the bottling trade.

In any event the continuous system was among the earliest of the Matthews bottling plant equipment items to attract attention in scientific and industrial circles, for shortly following the patenting in 1867 of the continuous carbonator it was illustrated and praised in the *Journal of the Franklin Institute* (October-December, 1868). The same item also described and illustrated the Matthews generator and portable fountain type of carbonator, as well as the generator-carbonator, and bottling table, being produced. The latter did not include a syrup pump or syrup gauge, as an integral part of the filler. The popular syrup gauge of Putnam had been patented in 1861 and introduced into the trade.

THE MATTHEWS CATALOGUES

The John Matthews firm was the most prolific in the field in issuance of catalogues of the equipment and supplies offered the trade. The first catalogue was issued in 1860,—the beginning of a series extending to 1891. During the 1873-1876 period three separate catalogues were used each year.³

Catalogue No. 1 contained illustrations and prices of apparatus for the druggists and other dispensers of "Aerated Beverages." No. 2 covered the apparatus and materials used by bottlers of soda water, ginger ale, sparkling wines, etc. No. 3 related to apparatus and materials used by wholesale dealers in soda water and mineral waters in portable fountains (tanks).

To the druggists Matthews offered a wide variety of combinations to suit the needs of the potential market. In the 1876 catalogue, for example, for those in small towns of about 500—was recommended 1 upright generator, 1 four-gallon portable fountain and frame, and the "Jack Frost" marble counter draught apparatus, or fountain; total cost \$188. For other towns up to 2,000 people, the necessary equipment was priced at \$315, while for "a complete apparatus for making and drawing soda water, for a store in a large town or city" the cost was \$978. The deluxe "Frost King" fountain, however, with "complete apparatus for making and drawing soda water for a first class store in a large city," was priced at \$2,976.

The description of this luxury piece of soda fountain equipment is good illustration of the art of enticement used by the advertisers of that day and age. It reads:

The "Frost King" is made of the richest polished marble, embellished with silver plated crestings and mountings. It unites every improvement known to the art, and is strictly first-class in every particular. The style of Medieval. The apparatus is finished on all sides. The richly polished marble exterior is elaborately engraved and gilded. The mountings and fittings are of bronze, heavily plated with silver, and jeweled with more than sixty real stones. Cut and polished. The exterior is pierced on two sides, and openings filled with panels of heavy plate polished glass in two thicknesses. Has coil and glass coolers, in silver plated frames, steady stream attachments and portable glass sirup tanks. Exhibits the interior, with the ice and circulation of the aerated waters. Draws sixteen syrups, four different mineral waters, carbonic acid or soda water on two sides. Plated doors in burnished and frosted silver, enriched by sculpture and engraving. Doors to enclose sixteen tumblers in the cooling chambers. Flint glass nozzles on all the draught arms. The apparatus is provided for means of illumination by gas or otherwise, which renders it very attractive at night.

And then for the super-deluxe trade, the "Snow Queen" fountain, made in "Fine White Italian Marble" was offered at \$4,250, to which an additional \$1,000 could be added for a special order to make the unit "in a combination of the finest marbles, of the richest natural colors, selected . . . with a view to produce the best possible effect by day and night." For the excellence of this unit, displayed at the 1872 Exhibition of the American Institute, in New York, a "Medal of Special Award" was given to the Matthews firm in November, 1872.

COMPLETE BOTTLING PLANTS

In the bottlers' catalogue, the Matthews estimate for supplying "a complete establishment for making and bottling soda water, ginger ale, etc., using corks" was \$1,146.45. This included \$400 for the carbonating apparatus consisting of a Matthews No. 2 Generator (horizontal, made of iron), with two stationary fountains (or carbonating cylinders); capacity 200 dozen bottles with one charge of the gas generator. The Matthews Best Bottling Machine, with Patent Folding Safety Screen and all improvements was \$125; syrup gauge was available for \$50 additional. Fifty gross of bottles came to \$350, and the Patent Wire Cork Fasteners and tubing \$10. A supply of flavoring extracts, coloring, acidulant, and other incidentals, including 2 barrels of Matthews ground marble and 330 pounds of acid for making the gas, accounted for the balance. If the Matthews machine for washing bottles was required, it could be had for \$10 additional.

A similar bottling plant setup for using bottles with the Matthews Patent Stoppers was priced at \$1,045.85. Despite the lower quoted price, the cost was greater. Thirty gross of the special bottles cost \$210, and 4,320 of the Patent Gravitating Stoppers cost \$194.40. But the bottling machine for the patented stoppers was not sold. It was rented to the bottler for \$25 per year; he paid \$100 deposit on it which was included in the price quoted.

The generator and the fountains above referred to were lined with porcelain; those lined with block tin were available at a higher price.

Larger units, also, were available, the largest consisting of a horizontal generator making at one charge 1,300 gallons of soda water, with two stationary fountains making together two hundred gallons of soda water at each filling. Thus the equivalent of about 1,860 dozen

bottles could be made with each charge of the generator. For this iron unit, block tin lined, the price was \$2,000; additional fountains could be added, with gas washer connected, for \$600 each.

It will be noted that the foregoing generator and fountain apparatus was made of iron. Similar equipment made of copper or of steel also could be had; the price was higher. The large unit above-referred to, for example, in copper, was priced at \$2,600, with \$780 for each additional fountain. The cast steel unit, in the same size, was priced at \$3,000, plus \$1,000 for each stationary fountain in excess of the two comprised in the unit.

Further reference to the Matthews equipment, and closures, offered for bottlers' use will be referred to in later Chapters.

The Matthews firm also produced the detached generator for bottlers and others who charged the portable fountains with soda water for stores dispensing them. Iron generators, of the smallest size charging 6 to 12 gallons at one operation, were priced at \$120; the steel generator of the same capacity was \$150. Sizes then varied up to the largest producing 300 to 900 gallons at one operation, priced at \$900 for the iron generator; \$1,500 for the steel. The iron type of portable fountain, lined with porcelain, or pure tin had been long in use as the carbonator. Placed on its agitating frame, filled to the desired capacity with water, and connected with the generator for the gas, the carbonation was then accomplished by rocking by hand.

The portable iron fountains came in capacity sizes varying from 4 gallons to 20 gallons. Comparable costs varied from \$18 to \$75 each for the porcelain lined, and \$22 to \$100 for the tin-lined. The iron rocker frame, to hold the fountain during the carbonating process, was additional.

Fountains also could be ordered, tin-lined, made of copper or of steel, but the price was considerably higher.

THE STEEL PORTABLE FOUNTAIN

The Matthews firm was among the first in the field to recognize an important connection between product quality and the equipment used. The block tin-lined steel portable fountain may be attributed to that, as well as to the added strength it provided, with less weight.

Numerous types of the portable fountains had been in use through the years. Matthews produced, for example, the glass-lined iron fountain, a special one used for mineral waters and sparkling wines. Another had a silver lining. And then there were the early types of copper fountains and the iron fountains, tin-lined, for soda water, but these had their questionable points.

The copper fountain, particularly, shared with the copper-base mechanism of some of the soda dispensing apparatus the serious criticism of the fountain operator and his customers. The tin lining on copper was usually a tin wash, thin, and relatively short lived in contact with the acidulated drinks and carbonated waters for which they were used. The result frequently was metallic contamination of

NICHOLS' Patent Syrup, Soda, and Mineral Water Apparatus.

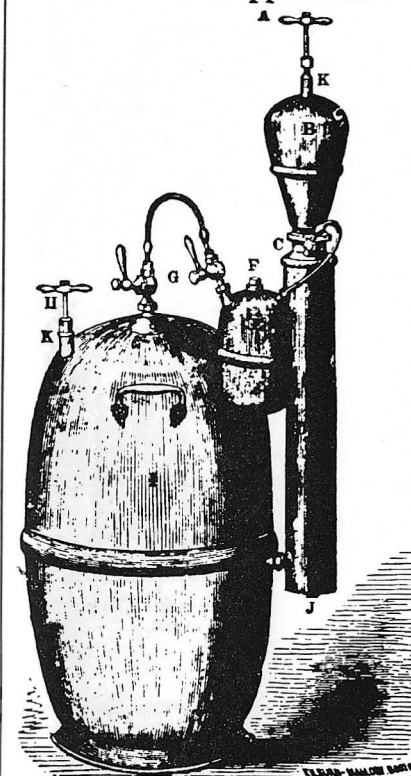


Fig. 2.

The value of an apparatus which will enable the operator to make the best Soda Water in the shortest time, with the least trouble and expense, is sufficiently obvious to all who are engaged in its manufacture, and for authority to offer **NICHOLS' PATENT** as the only one to meet this great desideratum, we give the fact of an unusual success which has attended its introduction, and reference to a host of influential dealers, whose voluntary testimonials are alone sufficient to establish our claim to superiority; and this merit is claimed not only for the simplicity, compactness, and portability of the apparatus, its cheapness and adaptation by various sizes, to the wants of all, but also for the quality of water made by it, which for strength and purity is unequalled.

MORSE'S GENERATOR, a new article.

Every year we bring out something new, and this last achievement is another proof of pre-eminence in our business; also, some new and pretty styles of *Draft Stands*. No one can consult his interest without first examining our pamphlet.

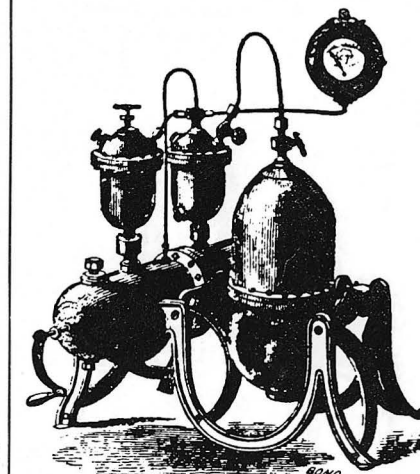
BOTTLING MACHINES,

of different sizes, and with many improvements upon the old style.

SODA WATER, SODA WATER

Patent Soda Water Apparatus, Generators, Bottling Machines, Pumps, Coolers, Draught Tubes, for the Counter, and every description of apparatus for drawing and bottling; also, small machines for country use \$30. **WILLIAM GEE & CO.** 6 and 7 New Haven R. R. Buildings, Franklin street, opposite the Tombs, New York. 36,40.

SODA WATER APPARATUS.



MATTHEWS' MACHINES FOR MANUFACTURING PURE SODA OR MINERAL WATERS.

These elegant Machines are universally conceded to be the most simple, efficient, durable, and economical in use, and they are sold at a lower cost, capacity considered, than any others in the market.

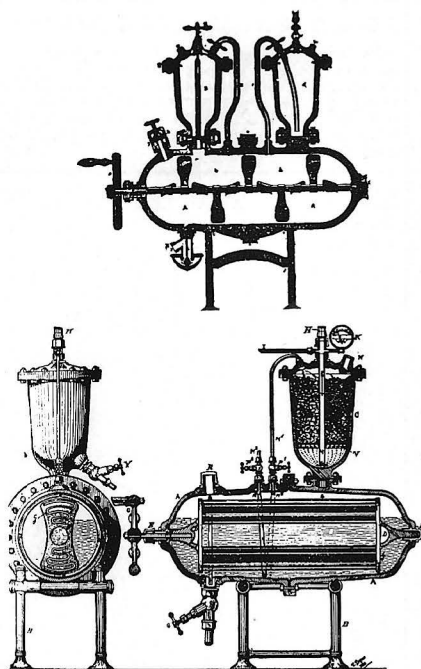
Unlike other machines adapted to the use of one material only, these machines may be used with all the known materials with ease and economy. The advantage they thus offer is at once apparent when it is considered that the cost of Soda Water made from the Carbonate of Soda, is more than double that manufactured from Ground Marble.

The water manufactured by these machines is of superior quality, and does not come in contact with copper or any other pernicious metallic substance.

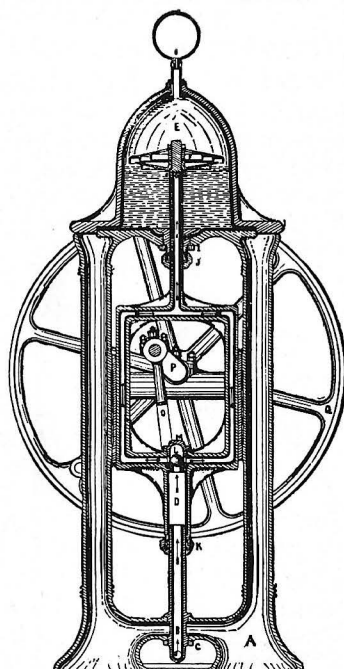
MATTHEWS' ORIGINAL SYRUP PUMPS for Counter use, throw just the quantity of Syrup for each glass, do not drop or attract insects, and being plated with silver inside and out, are pure and very elegant in appearance.

MATTHEWS' NEW COMBINATION COOLER AND DRAUGHT TUBE for the Counter. Several superb new patterns, designed by eminent artists, are added to the unusually large assortment. They are a great improvement on the inelegant sheet metal articles before offered to the public.

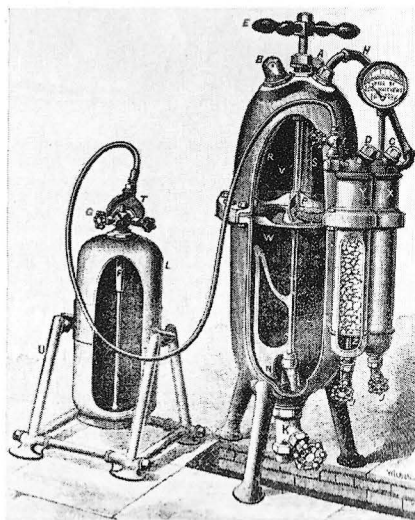
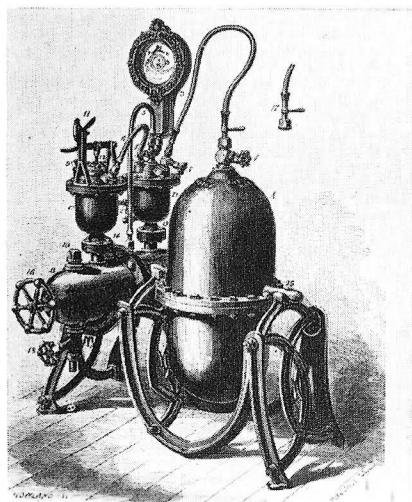
ILLUSTRATED AND EXPLICIT PRINTED DIRECTIONS, which every one can understand, accompany each apparatus, enabling any person to put up and use the machinery. They contain full instructions for the manufacture of the best Water, and original proved recipes for the preparation of seventeen varieties of choice Syrup, including the celebrated Cream &c.



Cutaways—Generator, and
Carbonating Fountain.

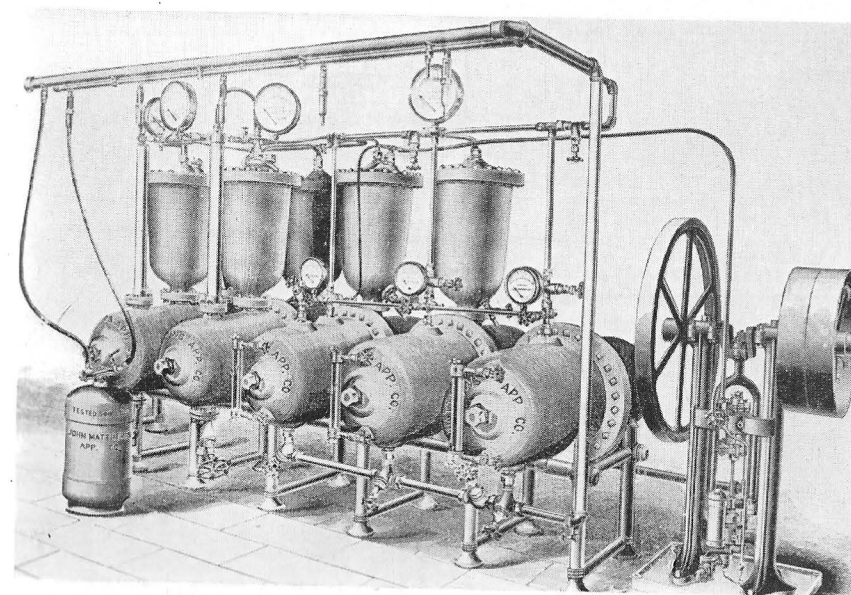
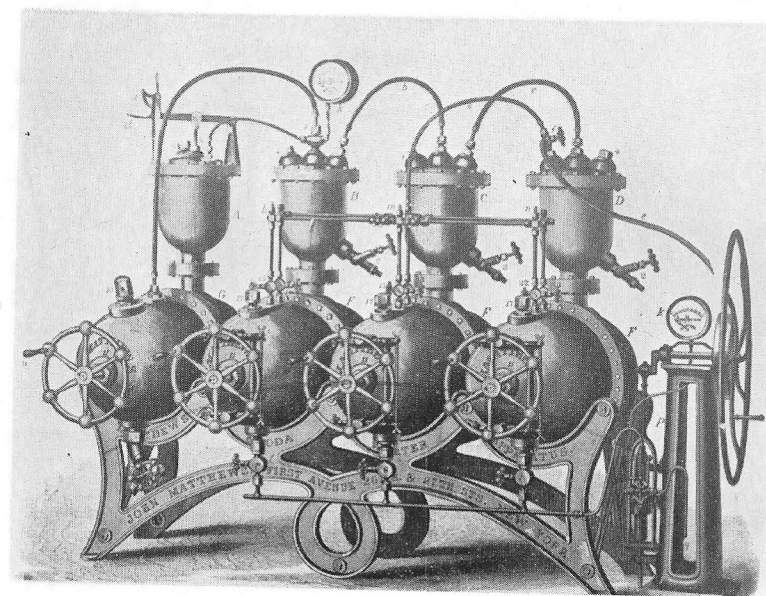


Matthews Continuous Carbonator
—c. 1868.



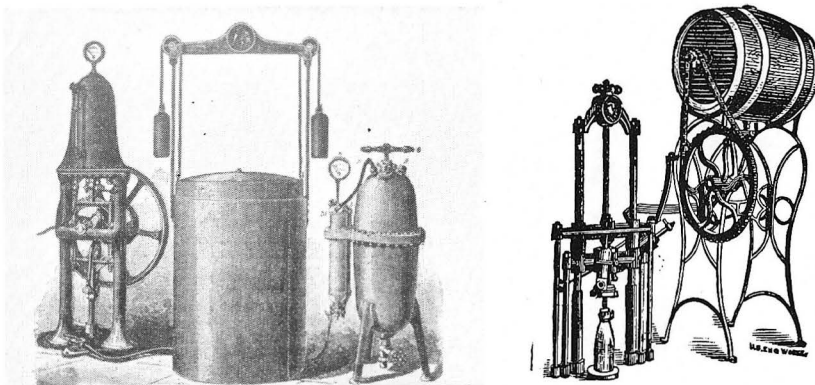
Horizontal Generator and Fountain; Vertical Generator and Fountain. *Matthews—1876 Catalogue.*

AMERICAN 19TH CENTURY CARBONATING EQUIPMENT

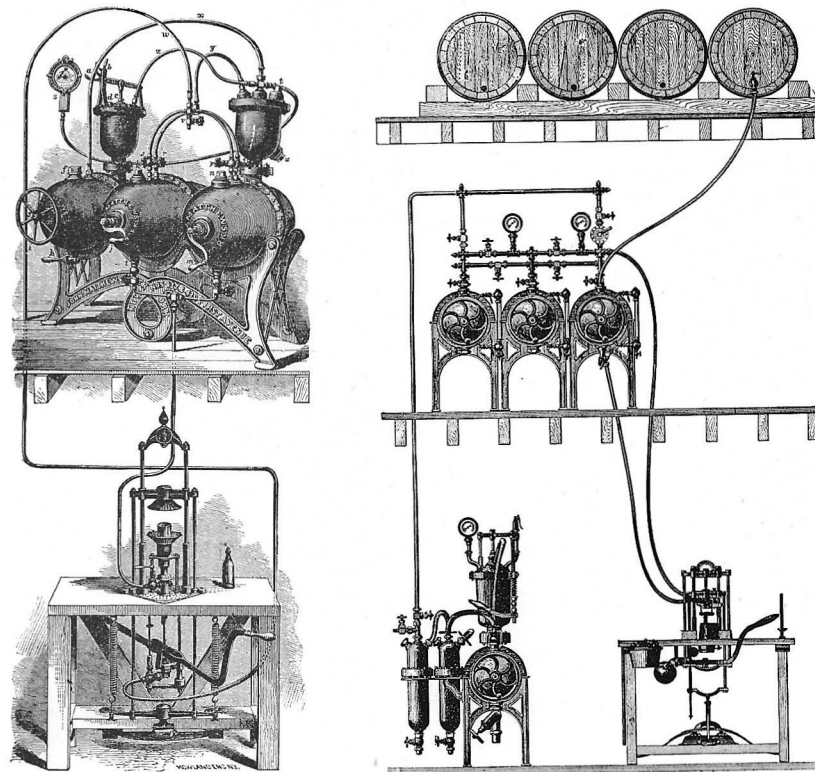


Generator-Fountain Apparatus: (1) Hand Operated, (2) Power Operated.

MATTHEWS SODA WATER EQUIPMENT—1876



Matthews Continuous System—c. 1870; Robertson's Syrup Blender—1882.



Soda Water Plant Arrangements: (1) Matthews—1876, (2) Tufts—c. 1890.

SODA WATER PLANT EQUIPMENT—LATE 1800's

the product, unpleasant taste, and unfavorable public reaction. During 1877, for example, three monthly issues of *New Remedies*, the druggists' magazine, contained a series of articles warning the druggist against unsuitable metallic devices and parts used at the soda fountain. It recommended the steel portable fountain for safety and purity.

The Matthews firm had recognized the problem early. For a time the cast-iron fountains were lined with porcelain or similar vitreous material in the form of an enamel, as substitute for the tin-wash on copper. As early as 1864 John Matthews, Jr. patented the process of saturating such enameled iron fountains with paraffine, to close all pores in the vessel and form a protective coating against chemical action.⁴

The Matthews steel fountain covered by his 1872 patent, however, was an important event, for the flexibility of the sheet steel used provided not only the necessary strength for the inner lining of block tin, but it did that with a considerable saving of weight. That added much to its ease of handling in the trade. Further improvements in the steel tank were made, protected by additional patents in 1875.⁵

Competitor suppliers, of course, were soon in the field with their own design of steel fountains, which quickly supplanted the older types. It was particularly fortunate from another view, also, because with the later practice of soda fountain operation to use the portable fountains of soda water prepared by the bottler, the bottler's need for such an item was greatly increased, and it was well served by the steel fountain.

The 10 gallon portable steel fountains were priced by Matthews in 1876 at \$40 each; the 6 gallon at \$35. And the Matthews Patent Wagon for transporting them (capacity sixteen of the 10 gallon fountains, and requiring but one horse) was priced at \$450.

MATTHEWS WINS AWARDS

The Matthews line of equipment and soda water apparatus, during years following the catalogue of 1876, showed some changes in design and adaptation of the equipment to use of power (the firm also sold steam engines for bottling plants). But their essentials remained the same, and the line no doubt merited the high esteem in which it was held by the trade.

And, of course, the Matthews firm did much to encourage that popularity by calling attention to the wide recognition given the excellence of its products both in America and abroad, for the firm was a constant participant in the public exhibitions of equipment.

As early as 1859 the Matthews equipment on display at the Exhibition of the American Institute, in New York City, was awarded a silver medal. And similar awards were made by the American Institute at virtually every annual exhibit during the years 1863-1875; in 1873 the firm won six of the highest prizes awarded, and 16 in 1875. The Matthews gravitating stopper won such an award in 1871 and 1874.

At other public exhibits similar recognition was given, such as came from participation in the exhibit of the American Pharmaceutical Society, in Philadelphia, in 1868; at the International Industrial Exhibition at the Mechanic's Institute, in Buffalo, in 1869; at the Cincinnati Industrial Exposition of the Ohio Mechanics Institute, in Cincinnati, in 1870; and at the 20th Annual Exhibit of the Maryland Institute for Promotion of the Mechanic Arts, in Baltimore, in 1870.

Nor was that all, for the Matthews firm was able to claim international recognition coming from similar awards based upon their equipment displayed at the International Exhibitions in London (1862) and at Paris (1867). And, at the Great International Exposition in Vienna, in 1873, the highest prizes in its class—two First Class Medals and Certificate—were awarded to the Matthews apparatus.⁶

In 1891 the Firm of John Matthews was one of those which combined to make the American Soda Fountain Company. However, the Matthews name persisted for some time as a distinct entity in the supply business. The John Matthews Apparatus Company was in business for several years during the 1890's and early 1900's, and at the turn of the century George Matthews and John H. Matthews were advertising to the trade as the "sole surviving partners of the Firm of John Matthews." As late as 1920 the Matthews Soda Water Company, at 335 E. 26th Street, in New York City, was advertising "Matthews Soda Water Tanks" to the trade.

OTHER PIONEERS

Another one of the bottling industry pioneers, with activity somewhat similar to that of Matthews, but with much later entry into the trade, was Selden Twitchell. During the later decades of the 1800's the Twitchell firm gained an important relationship to the soda water bottler as a source of virtually any item he needed, whether in the way of equipment, materials, closures, or the flavorings for his bottled products.

George S. Twitchell operated a soda water bottling plant in Philadelphia for more than a decade prior to 1860, and it was a large one by the standards of that day, operating twenty-three delivery wagons. But it was in 1860 that his son Selden Twitchell was brought into the business, and from then until 1869 the responsibility for operating the bottling plant fell increasingly on his shoulders. The Twitchell specialties were mead, spruce beer, and tonic root beer, put up in stone bottles, stoppered by corks tied with string.

About 1868 George S. Twitchell sold his bottling business to the employees, Selden Twitchell remaining one year as manager for the purchasers, and in 1869 started his own business as an exclusively bottlers' supply house, the first of its kind, in a third floor back room at 911 Vine Street, in Philadelphia. The business continued to grow, and early in the 1880's a three story building at 225 Vine street was occupied, part of which was a sugar house. Three adjoining buildings were added later. Then, in 1882 Oscar Twitchell was taken in as a partner and the firm name was changed to S. Twitchell & Brother.

The partnership lasted until 1893, when Oscar retired because of poor health; died in 1917. In 1899 the business was incorporated as S. Twitchell Company.

The "company" part of the business included Charles O'Connor, starting in 1884, and Harry R. Hess in 1895 was employed as chemist in charge of the laboratory. Selden Twitchell retired in 1912, and turned over complete management of the business to Mr. O'Connor and Mr. Hess. Mr. O'Connor became president of the firm and its general manager, in which position he served until his death in 1957. Myron J. Hess, with the firm since 1924, then managed the business until his death in 1958.

As the business of the firm expanded the four buildings occupied were rebuilt as one, giving room for the wide variety of activities carried on in the making of the flavoring materials used by the soda water bottlers, and for the manufacture of tools and equipment of various kinds, such as carbonators, generators, bottle washing and filling machinery, closures, and many of the other things needed to meet the daily requirements of a soft drink bottling plant. Some of these will be referred to later. In 1950 the business moved to Camden, N. J.

In the later years of the 1800's the trade saw the entrance of numerous competitors for Matthews, Twitchell, and the other pioneers mentioned previously, and new centers opened to the expanding industry for its bottling equipment and appliances.

By 1893 the roster of such competitors included the New York City firms of Bennett & Gompper; Bottlers' & Brewer's Machine Mfg. Co.; Chinnery & Co.; Witteman Bros.; and Edward Ermold. Geo. S. Slocum was making bottling plant equipment at Newport, R. I.

Hartt Manufacturing Co. and Jacob's Bottlers Brass Speciality Works were among the later suppliers, in Chicago. Nearby Milwaukee, meanwhile, became quite a machinery supply center, with its list of pioneers including such names as Lutter & Gies, Philip Madlener, Wiesel & Vilter Manufacturing Co., and Otto Zwietusch.

In addition, the manufacturers of some of the newer closures in the field had found it advisable to provide the bottling machinery adaptable to the use of their types of stoppers. These included W. H. Hutchinson & Son, Chicago, the De La Vergne Bottle & Seal Co. of New York City, and the Crown Cork & Seal Co. of Baltimore. Henry W. Putnam had been doing this for several years.

Victor Barothy, of Chicago, was specializing in second-hand machinery for the soda water trade.

And the trade paper advertisements of the period continued to feature the availability of British equipment to the American bottler by Barnett & Foster, of London.

8

Early Carbonating and Bottling

WATER TREATMENT WAS SIMPLE

The preparation and treatment of water for carbonating in the early bottling plants was a simple procedure. The general procedure as late as 1888 may be summarized by the following instruction given by Sulz in his *Treatise on Beverages* of that year:

Precipitation, aeration and filtration are decidedly the means we must adopt for a continuous, safe and effective method of purifying water. By the alum process, earthy and alkaline carbonates and foreign matters and humus bodies are precipitated and even under certain conditions bacteria are destroyed. By aerating the water with special appliances, such as air compressors, etc., we substitute for the oxidizing power of the animal charcoal one of even greater energy and more continuously acting. By then filtering the water thus treated through properly prepared sand, coke, or other coarse filtering medium, we employ the proper method of purification.

Sand, animal charcoal, and sponge were the recommended mediums for removing suspended matter from the water by filtration. Asbestos and filter paper, also, were sometimes used. The Matthews firm made the Bigelow-Curtis filter for bottling plant use. It was a sand and charcoal filter. Puffer made a sponge filter, and the firm of Dr. Bowker in Boston had a simple form of charcoal filter they sold to their customers.

There were others, of course, but for decades and well through the later years of the century the soda water bottler relied largely upon the simple, and generally effective medium known as the stone filter, made of sandstone. Impregnation of the water with carbon dioxide had its own purification properties, and it was carbonation which was the most important process in his preparation of the water for the bottled soda water.

NEED FOR CARBONATING EQUIPMENT DEVELOPS

The outline of early fountain dispensing shows the simple nature of the carbonating equipment used by John Matthews and other pioneers in that field. Major mechanical problems encountered no doubt were many and connected with the preparatory processes—generating of the carbonic acid gas and getting it adequately admixed with the water to provide the desired effervescence. The same was true of bottling it. Yet with only the small number engaged in the bottling of the artificially carbonated waters for commercial use the economic incentive for development of bottling equipment was small,

for as late as 1849 plants for bottling soda waters and mineral waters in the United States numbered less than 75.

That provides another explanation for lack of real progress in the manufacture of American soda water bottling equipment during the early years of the 1800's, and imported European equipment was available to meet the limited need. As late as 1882-1886 the English equipment of Bratby and Hinchliffe and others, was being displayed at the bottling industry expositions in this country, while other British firms consistently advertised their bottling devices to the American trade well into the closing years of the century.

Available patent records also show that preceding the mid-century mark, American inventions relating to the carbonation of waters had little or no connection with preparation of the product for bottling, but were primarily for the fountain method of preparation and dispensing. It was not until after 1850 that the types for bottling plant use began to appear.

As examples, a few of these may be mentioned. Among the first was an improvement in the type of cylinder-generator then in use, made by William Gee, of New York, and which he patented on June 12, 1855. Gee invented a generator with removable ends held together by a center shaft and a single nut so that it could be disassembled with little labor, and in a few minutes, for cleaning the chemical residues from it. Special credit also was given to him in the trade for his later invention of the self-closing valve for gas generators.¹

A type of vertical generator was patented by J. F. Boynton, of Syracuse, N. Y. in October, 1856, to be followed by other patents to Gee for carbonating devices in 1862, 1863, and 1865. Yet even these were for the generating of the carbon dioxide and impregnation of the water primarily for fountain. Use for bottling was incidental, but the bottling trade was increasing and the firm of John Matthews was one of the first to recognize its requirements and the nature of them.

THE CONTINUOUS SYSTEM²

With John Matthews having gained his initial experience in England, it was quite natural that he favored to some degree the Bramah system of generating-carbonating-filling. He was familiar with it, for it was quite typical of that used by the British trade since the early years of the 1800's and for some years later. Sulz called it the "continuous direct-action process." At least when the Matthews firm began manufacturing larger equipment for bottling plant use after mid-century, the units offered included the continuous system of Bramah, as well as the units for the intermittent system. The latter system was greatly favored by the American trade, and was almost always used. Sulz attributes this to the fact that it was less expensive and well adapted to the modest needs of the American bottler of that time. And by adaptation it could be made to serve substantially continuous production.

The English continuous system, as produced here by Matthews and others, consisted essentially of the gas generator, the gas holder (or gasometer) in which the gas was collected, a force pump, and the

carbonating vessel into which the water and gas were introduced and mixed under pressure of the pump. The carbonating process was a continuous operation, so that the bottling of the processed liquid was uninterrupted. The bottles were filled from an outlet valve connected with the carbonating chamber.

The keystone of the continuous system, therefore, was the carbonating machine, and the development of a unit into which the gas and water were pumped simultaneously, under high pressure, and agitated to provide a continuous supply for bottling, was one of the first major mechanical achievements patented by the junior John Matthews. This was in 1867. The new Matthews' carbonator was given prompt recognition by the Franklin Institute in its 1868 Journal as a distinct advance in the art of impregnating water with carbonic gas under pressure.³ And it became a prominent feature of later catalogues to the bottling trade as part of the American system for bottling which Matthews offered as a substitute for the Bramah system.

THE INTERMITTENT SYSTEM

In the intermittent system, the gas was generated in one vessel (the generator), and piped from it to the fountain, or tank, which served as the carbonator and which contained the water to be carbonated. There gas and water were mixed by agitation or rocking, and the carbonated liquid was drawn from it into the bottles. The Matthews apparatus for soda fountain use, previously described, was of this type, and usable by the bottler as well. Then, when the soda water in the tank fountain was all bottled, the fountain had to be refilled with water and gas, and the process repeated.

The American intermittent equipment also had added features, although the foregoing were the essentials. The connecting acid receptacle, attached to the generator, was typical, and also the gas washing chamber between the generator and the fountain. As improved models appeared for bottling plant use, the tank-fountain was fixed in horizontal position alongside the generator, as in the Gee apparatus offered the soda fountain trade in 1860.

Mixing of gas and water was done by rotary dashers, or paddles on a shaft inside the tank, rather than by rocking it as in the models for store use. Also, as in some earlier models, a pump was provided. This was primarily to move added gas or water into the fountain against any pressure remaining in it. Pressure for the carbonating process came primarily from the gas pressure of the generator.

The intermittent carbonating process provided by such a unit was readily adapted to perform a substantially continuous operation. This was done by increasing the number of carbonating tanks, or fountains, to a battery of two or more. Then the carbonated contents of the one could be bottled while the other or others were being replenished and agitated. Where volume required it, an additional gas generating tank could be installed in the battery, and the number of fountains increased. In this way a reasonably continuous source of gas, and of carbonated water, was provided by the unit for bottling.

Thus the so-called intermittent system became to all intents and purposes an American continuous system, and was commonly so called. It had a high degree of flexibility in meeting the requirements of the business. That was necessary for it was a summer business, and the size of the bottling operation varied with the size of the community in which it was located. It was this system, in units of various sizes, therefore, which typified the bottling plant in America from the expansion period immediately following mid-century until liquid gas and the improved models of carbonators for it were adopted.

THE "KNEE BOTTLER"

Bottle filling in its early forms was a manual operation and was nothing more than placing the bottle under the spigot from which the carbonated liquid was drawn from its reservoir. With soda water, of course, the process presented its difficulties. With the liquid under high pressure, it took much care to avoid loss of the contents.

Where flavoring was used, the syrup was first poured by dipper and funnel into the bottle; then the soda water from the spigot, or filling tube. Skill was something of a factor, for only experience taught when relief of the pressure in the bottle was needed in order that more liquid could be added.

The "Knee Bottler" operator, to fill the bottle properly, had to know just when to release the bottle slightly from the filling tube, as pressure built up. This was the "snift," and he did it by lowering and raising his knee, on which the bottle rested. It was quite an accomplishment, also, when the bottle was full, to get the cork inserted without losing the contents, after which the cork had to be tied on the bottle with wire or string.

It was an awkward, somewhat difficult procedure, and did much to influence development of the simpler, and more efficient bottling table.

EARLY BOTTLING TABLES

The first of the bottling tables were relatively simple affairs. In the Matthews machine, for example, the bottle was placed directly under the mouth of the bottling cylinder, or filling head, the latter having a valve and pipe connection with the fountain reservoir. Pressure on the foot treadle lowered the cylinder to a tight connection on the bottle top. Then, a wet cork having been placed in the top of the bottling cylinder, downward movement of its hand lever lowered the corking piston to push the cork into the cylinder, to a point just above the bottle.

The water valve then being opened, the bottle was filled; a vent valve in the filling head was provided to relieve the pressure. When the contents reached proper height, the valve was closed, the cork pushed into the bottle by pressure on the hand lever, and the filling head raised by release of the foot treadle. However, continued pressure on the hand lever was necessary to keep the piston in contact with the cork and hold it in the bottle until it was tied on. More frequently the tying was a separate operation, in which event special

tongs were used to hold the cork on the bottle while it was removed to the tier.

The features of the Matthews bottling machine, such as that just described were typical of the early American mechanical devices designed to simplify the filling operation so that only a minimum of experience would be necessary. To that extent it superseded the "knee-bottler" and helped solve some of the labor problems arising from his demands upon the shop operator. In this simple form the bottling table was no doubt an aggregation of mechanical features long known in the trade, for in this instance no one seems to have made claim to credit as its inventor; at least there would appear to be no U.S. patent supporting such a claim.

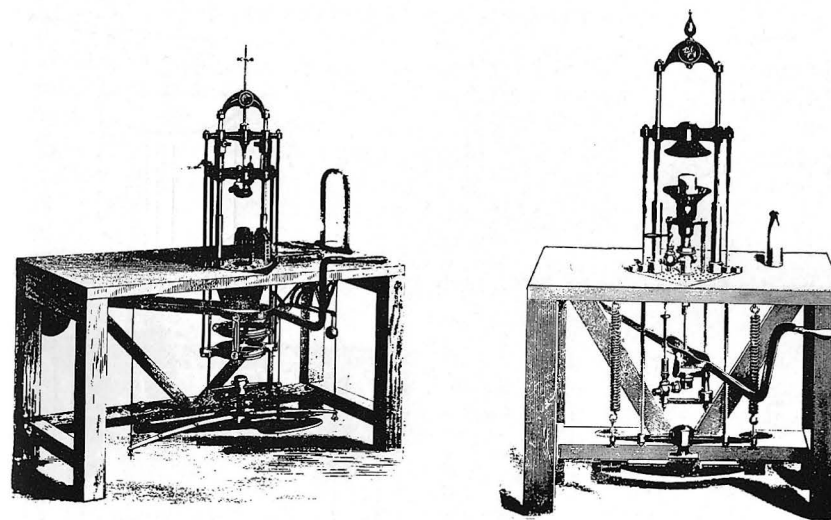
The bottling table, as such, made its appearance in the trade at least as early as the 1850's.⁴ Its general features appear in a patent issued in 1854 to Thomas W. Gillette, of New Haven, where it was used to illustrate his invention of a screen to protect the operator against injury from bursting bottles. Gillette was associated with John Matthews in some way, for the latter was the assignee of Gillette's patent. John Matthews, Jr. subsequently invented two modifications of the protective screen for use when internal stoppers were being used; this was several years later—in 1864.⁵

MATTHEWS USED COUNTER PRESSURE

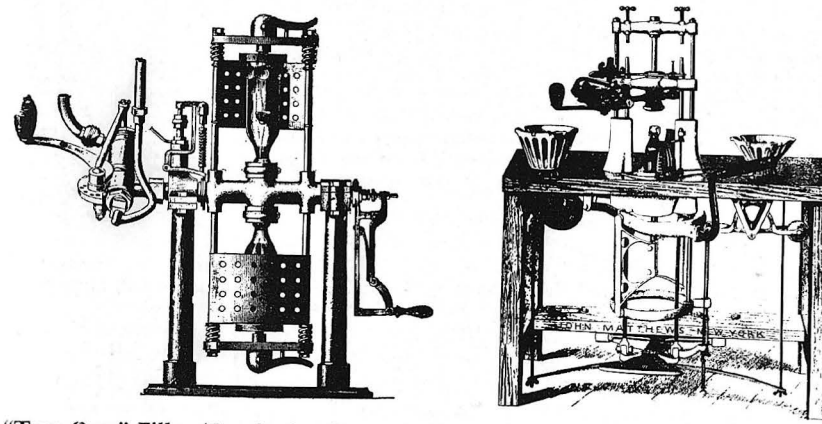
Shortly after the screen improvement was added to the Matthews line, several other improvements to the bottling machine evolved from their workshop. In 1866 the junior John Matthews patented in his own name the application of counter-pressure to the bottle filling operation.⁶ It appears as the first U.S. patent involving use of the counter-pressure principle in that way. By itself, the equalizing of pressure in a container being filled, and in the container from which the fluid or gas was drawn, was not new at that time. Its use is mentioned in literature of earlier periods, and it appears to have been a feature of some European apparatus during the years 1814-1840.⁷ It had also been used in the design of the generators and fountains.

Any novelty of Matthews use of it, therefore, was no doubt restricted to his specific bottling device patented in 1866. It was a relatively simple mechanism, too, for it merely involved one tube or pipe connecting the fountain containing the carbonated water with the bottle to be filled, and another pipe leading from the bottle to the top of the fountain. Through the latter pressure in both containers would be equalized and the gas ejected from the bottle in the filling operation was returned to the fountain. Both pipes were opened and closed by valves. Thus the uniformity of pressure obtained, he explained, would prevent foaming and serve to prevent the loss of the gas ejected from the bottle in the filling operation.

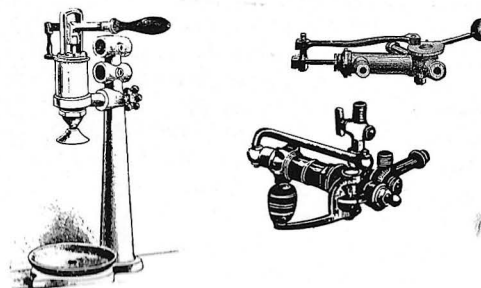
In the following year the inventiveness of Matthews was again shown with his design of a cup-type device to fit into an aperture in the table below the filling head and to serve as the rest for the bottle being filled. The depth of the cup was varied according to the height



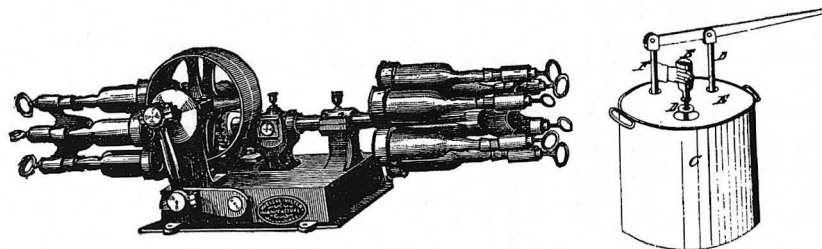
Matthews Bottling Tables: (1) Corks, (2) Gravitating Stoppers.



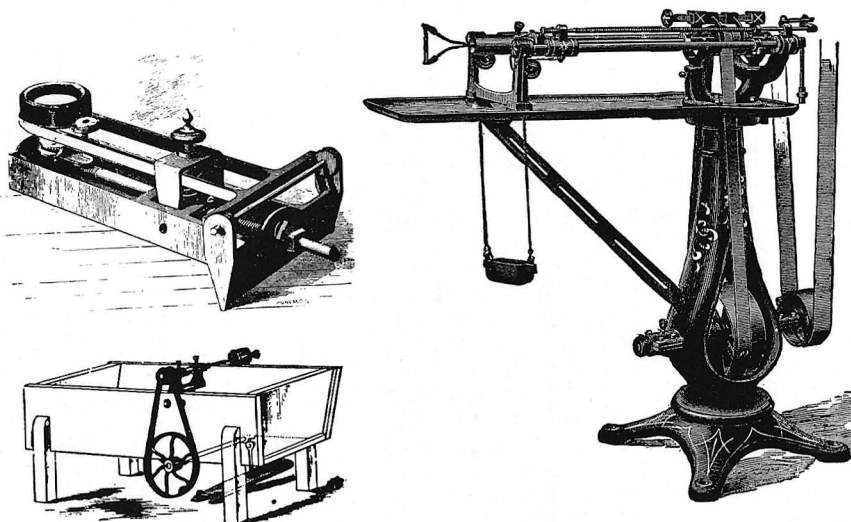
"Turn-Over" Filler (Gravitating Stopper); Matthews Bottling Table (Syrup Gauge).



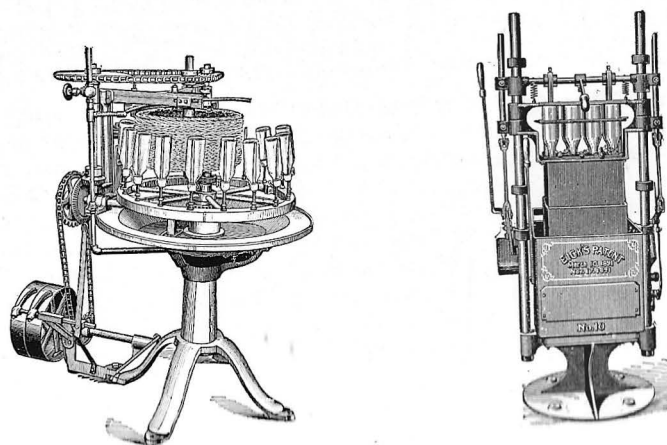
Manual Syrup Gauge; Putnam Syrup Gauge; Matthews Solid Plunger Syrup Gauge.



Shotter for Scouring Bottles—1893. Early Patented Bottle Washer (Cronk—1849).



Matthews Bottle Washer—1876; Enterprise Bottle Soak and Washer—1889; Improved "Lightning" Bottle Washer—1892.



Hamann Bottle Washer—1893. Eick Bottle Washer—1892.

EARLY BOTTLE WASHING EQUIPMENT

of the bottle, so bottles of various sizes could be filled with minimum adjustment of the filling head and corking piston.⁸

SYRUPING AND THE SYRUP GAUGE

And then there was the matter of syruping, in which the syrup pump began to replace the dipper and funnel. Matthews had one they designed—a portable pump. That is, it was manually operated, connected with the syrup can by hose and fixed on the bottling table. It was used to throw the syrup into the bottle before it was placed under the filling head.

The major success of Henry W. Putnam in the soda water field is reported as that connected with his invention and promotion of his patented syrup gauge about 1861.⁹ The need for such a device was explained by him in his patent application as follows:

The ordinary way of filling bottles with sirup and mineral water is to pour in the sirup first with funnels and dippers. They are then taken to another place, where they are filled with mineral water from fountains charged with carbonic-acid gas, an ordinary faucet being used to admit and cut off the same. The corks are then driven in and secured by twine or wire fasteners; but with my invention bottles are filled with the regular quantity of sirup, and with the same continuous operation the mineral water is forced in, overcoming entirely the common difficulty arising from flies, and only two-thirds of the labor is required with this apparatus that is indispensable in the ordinary method, for in the usual way it requires one person to fill the bottles with sirup, another to handle them, and a third to put in the mineral water, when with this apparatus one person only is required to operate the apparatus and cork the bottles, while another hands them to and from the operator, dispensing entirely with one hand, two persons thus performing the labor that requires three persons in the ordinary way.

With the Putnam gauge the amount of the syrup throw could be set in advance. The gauge could be used separately, but generally was connected directly with the filling head on the bottling table. Thus the separate handling of the bottle for the syruping was avoided.

The Putnam patented syrup gauge must have been an efficient and popular device, for Matthews and other equipment suppliers also added it to their lines. Nevertheless, within a few years the Matthews firm was promoting its own "Matthews Plunger Syrup Gauge." As early as 1868 John Matthews, Jr. claimed patent rights on his design for an automatic pump by which the syrup throw would be synchronized with the operation of the filling head or of the corking piston, prior to the soda water fill.¹⁰ It never seems to have appeared as a standard part of the Matthews bottling table unit. However, the Putnam syrup gauge was widely used on the bottling table produced by Matthews and the other manufacturers of bottling equipment, and was shown on the tables illustrated in the catalogues. Other models of the syrup gauge, or pump, were made by Tufts, and by Slocum.

The syruping operation required its accessories, including the over-head cans, jars, or other vessels in which the flavored syrups were contained during the filling operation, and the flexible pipe or hose connecting such container with the bottling table. But these were relatively minor matters, and their adaptation depended largely upon the needs of the particular operator and his ingenuity.

The application of heat in the preparation of sugar syrups, for purposes of purity and quality of product, was normal practice in the better plants, and had been recommended in the literature as early as 1875. Prior to 1890 Charles Lippincott & Co. and other suppliers were featuring steam jacket kettles, for syrup making, in their advertising.

THE "TURN-OVER" FILLER

When internal stoppers, such as the Matthews gravitating stopper, the Codd bottle, and the other forms of floating ball stoppers made their entry into the field in the 1860's, that usually required the bottle to be filled in inverted position. In his bottling table Matthews accomplished this merely by reversing the positions of the bottle rest and the filling head. The syrup gauge could not be used on this machine. Syrup had to be placed in the bottle before it was inverted on the filling head or the throw could be placed in the filling head before the bottle was placed on it, whence the pressure would force it into the inverted bottle.¹¹

Albertson, the sometimes associate of Matthews, envisioned the likely need for a filler for internally stoppered bottles in which the bottle could be filled in upright position in the usual way and then upended to drop the closure into place.¹² Codd invented a similar machine. None of these, however, took on any position of prominence in the trade; at least they were never widely promoted. The relatively short life of the internal stopper in the United States and the general preference for the "Hutchinson" type of stopper may have been reasons for that. The "Hutchinson" type of stopper is not, of course, included as an internal stopper in this reference, since the stopper could be pulled into closed position while the bottle was upright.

SIPHON FILLING

Siphon-filling machines were an additional item of the line provided by Matthews and the others, but they were relatively simple devices, comprising essentially the bottle holder on its standard, the protective screen to cover the bottle while filling, the foot treadle which moved the bottle spout upwards into the filling head, and the valve of the latter by which the carbonated water was drawn from the fountain. When syrups were used in the siphons, they were first placed in the bottle, separately, by use of the syrup pump.

Wide use of the manually-operated bottling table continued as normal practice in the bottling industry through the later years of the 1800's. However, with the development of the single-use closures, such as the "Bottle Seal" and the "Crown" in the 1890's, new types of fillers soon made their appearance.

THE CROWN SODA MACHINE

The first of these were foot-powered fillers and cappers. Painter's invention of the Bottle Seal closure in 1885 preceded the crown; both will be referred to later. But they were the developments which were to revolutionize the bottle filling operation and equipment for it.

His foot-powered syrupe-filler and capper (1890) for use of the Bottle Seal was the initial step, for it was a novel piece of equipment, and pointed the way for ultimate elimination of the bottling tables, such as those of Matthews, Tufts, and Lippincott.¹³

Then Painter's patenting of the crown closure in 1892 was accompanied during that year by patent on a foot-operated machine for the syrupe-filling-crowning operation. Except for its use of the crown, in appearance and basic essentials the machine was much the same as his previous machine for the Bottle Seal, and rapidly superseded the latter. This type of filler-crowner was placed on the market by the Crown Cork and Seal Company about 1893.

Operation of the new type of filler, called the Crown Soda Machine, was described at the time as follows:

The machines are especially designed for filling and crowning carbonated beverages while under pressure, without loss of gas, including an automatic syrup gauge.

The table on which the bottle stands when the machine is being operated is adjustable to any height of bottle.

The crowns are contained within a cup in front of the machine, at the most convenient point for the operator.

Two bottles are always in use when the machine is being operated, which are moved from left to right across the table of the machine, the case of empty bottles being placed on the left-hand table leaf, and the empty case to be filled on the right-hand table leaf.

In operation the right-hand bottle under the head of the machine receives its required amount of water, while by the same operation, and at the same time, the bottle at the left, under the syrup cup, received its measured quantity of syrup.

The crown is placed in the throat of the machine before the bottle is filled, and when the head of the machine is brought down on the bottle by pressure of the foot on the treadle, a gas and water-tight joint is made between the head of the bottle and the rubber gasket contained at opening of throat, thereby preventing any escape of gas or water during filling. One hand lever operates the water valve, the snift, and the syrup gauge; another compresses and releases the rubber gasket holding the bottle in the filling head. When the bottle is filled, a quick downward pressure of the foot on the treadle crowns the bottle.

The type of syrupe-filler-crowner described above was entirely operated by the foot-treadle and the hand levers; adaptation of power sources to the combined operation came in later types of fillers. However, power-operated machines for the crowning operation only (no syrupe), single-head and multiple-head, were introduced in 1898, with the multiple-head crowners including the automatic crown feed patented by Painter in 1899 and 1900. This latter crowner was the predecessor of the "Jumbo" beer crowner later manufactured by Crown Cork and Seal Company and, a rotary, was the first of its type. With eight heads, it had a capacity of 60 to 100 bottles per minute.

The automatic crown feed device was added to some models of the foot-operated soda machines in later years.

However, the newer types of fillers and cappers were, for use of the patented type of closure exclusively, and early problems incident to its adoption in the country's bottling plants were many. As a result, conversion to the crown was relatively slow, which also restricted the use of the newer types of filling-capping equipment. Many bottlers continued the use of their older bottles, closures, and bottling tables, well into the 1900's.

9 *The Change to Liquid CO₂*

THE SPRAY CARBONATOR

The Matthews carbonating equipment of the 1860-1885 period was quite typical of the apparatus made by all other American firms in the field at that time, with its battery of generators and fountains, and accessory acid containers and gas washers. That was the general style manufactured by such other firms as Lippincott of Philadelphia, Puffer of Boston, Tufts of Boston, Dows of Boston, and many others.

Substantial progress by changes in carbonating procedures and carbonating equipment did not materialize until the mid-1880's, but they were coming.

In that field of carbonating equipment the introduction of the spray carbonator made practical application of the theory that better saturation of water with CO₂ required exposure of the maximum water surface to the gas. In his invention of the spray carbonator, patented in 1884, Roger F. Scannell, of Boston, is generally credited as the first to apply that principle.¹

In the Scannell carbonator the water and carbon dioxide were pumped simultaneously through a single pipe into a narrow vertical mixing chamber. There the gas and water were forced through a series of perforated disks, in the form of a spray, which flowed downward into the container, or fountain, from which it was drawn for bottling purposes. Equalization of the pressure in the fountain, and in the mixing chamber was had by a pipe connecting the upper portions of each. Use of the gas-water spray method, Scannell pointed out, gave effective saturation without the use of agitators, and avoided the use of labor or power required by the older mechanical methods of carbonating.

The general principles of Scannell's spray method of carbonating represented a definite advance, and soon made their appearance in other carbonating equipment. The Witteman carbonator for continuous bottling operation, for example, involved the use of spray impregnators, and was introduced to the trade in 1887-1888. Including other features, too, it was protected by the patent to Robertson, dated October 26, 1886.²

Development of the new carbonators was an advance but the ultimate of that was not to come until carbonic acid gas in liquid form was made available to the bottler as a substitute for the difficult and laborious process of generating it in his own plant.

LIQUEFACTION STUDIES³

While prior studies of the mystifying nature of effervescence in natural mineral waters had been made by such noted early European scientists as Libavius, Van Helmont, and Hoffmann, it was not until the experiments of their successors during the last half of the 1700's that real progress was made. Then the study of the phlogiston theory of combustion, later rejected, occupied the scientific mind. And it was that study of gases which caused such leaders in scientific thought as Hales, Black, Macbride, Priestley, Lavoisier, and others, to separate, identify, and find ways of producing carbonic acid gas.

With effervescent mineral waters representing the best example of nature's use of the gas, this then was sufficient reason for extending the experiments one more step—by attempts to duplicate those bubbling waters in the laboratory. This gave impetus to studies such as those of Venel, Priestley, and Bergman. And it was from those early attempts to prepare the artificially carbonated waters that their commercial production developed.

But through this long period, the generating of the gas in sufficient quantity and of suitable purity was something of a problem. And, with liquefaction of the various gases under study being another objective, it was but natural that the making of carbon dioxide in liquid form would be looked upon as one phase of that problem.

Michael Faraday (1794-1867), pupil of and successor to Sir Humphry Davy (1778-1829) at the Royal Institution in London, made the initial approach to the solution with his production of a small quantity of the liquefied gas in 1823. Using a bent glass tube of suitable strength, he caused to be admixed in it a dilute solution of sulphuric acid and ammonium carbonate. This was of such composition that, aided by cooling, the gas produced was of sufficient volume to be compressed by the pressure, and liquefied, but in a minute quantity.

Other experiments followed, with the effort constantly being directed toward increasing the amount of liquid. Small quantities only were possible by the normal laboratory methods, and substantially greater quantities would be required for any commercial use.

In the approach to that goal, Faraday's experiments were duplicated on a larger scale by Thilorier, in France, about 1835.

FRENCH AND GERMAN SCIENTISTS ACTIVE

In his method Thilorier used two cast iron retorts, one as the generator of the gas from a mixture of sodium bicarbonate the sulphuric acid, and the other as the condenser for the gas produced. The apparatus was inadequate and, it exploded during a demonstration at the Ecole de Pharmacie, in Paris, causing the death of his assistant, the operator. Thilorier also reports that, as an incident of his production of the liquid carbon dioxide, some of it solidified and assumed the appearance of a flaky snowy substance—the first making of solid gas.

Experiments such as Thilorier's were helpful in the step toward commercial production of the liquid gas, for they showed the neces-

sity of using compression and cooling. Faraday and others improved upon Thilorier's apparatus, and by 1850 much progress had been made. With the mechanism of the air compressor as a recent development, its use was one of the first steps. In 1844 Professor Pleischl in Vienna used a compressor constructed by Johann Natterer, his pupil. With it, after several hours of labor, one and one-quarter pounds of liquid gas were produced.

However, it was by further experimentation with the Natterer compressor that the first real success approaching a commercial basis was achieved by Dr. W. Raydt, in Hanover, Germany. With the modifications of the device necessary to produce pressures for liquefaction of the gas, Dr. Raydt finally succeeded in 1879 in producing nearly 100 pounds of the liquid CO₂. The machine had about 30 cubic inches compressor volume.

It was in that year that Raydt publicly demonstrated one important use of the new product—for raising of sunken objects from the ocean bottom. In this instance it was a ship's anchor resting in the bottom of Kiel harbor to which a deflated balloon was attached, then inflated by use of the liquefied gas, which was raised to the surface. With its potential for industrial uses thus shown, Raydt further promoted its commercial aspects by urging that it be used for pressurizing beer containers and drawing beer, and for making soda water.

In 1880 Dr. Raydt completed an improved model of his compressor capable of producing ten pounds of liquid gas per hour. This was widely recommended for use in the preparation of mineral waters in preference to the old method of generator, gasometer, and pump. By 1883 his system was installed in the mineral water bottling plant of Wolff & Calmberg, in Berlin, and about 1884 he had established a factory for the commercial production of the liquid gas. As the result of his activity he is generally credited as the "father of the liquid carbon dioxide industry."

Meanwhile there were others in the field, especially in experiments with use of the liquid gas for power purposes. In 1877, Dr. Hendry Beins, of Groningen, Holland, suggested its adaptation as power for various mechanical devices, including submarines. And it was a similar effort which gave substantial encouragement to liquefaction and commercial production of the gas in the United States, anticipating the Beins incident by a couple of years.⁴

U.S. DEVELOPMENTS

In 1875, the U.S. Navy Department needed 700 pounds of liquid carbon dioxide as the propellant for a "Lay Torpedo." Through the efforts of Walter N. Hill, at the Naval Station at Newport, R. I., using a mechanical compressor, a process was successfully developed for producing the liquid carbonic acid gas at the rate of 46 pounds per hour.

When Sulz published his *Treatise on Beverages* in 1888 the liquefied carbonic acid gas was so new as a commercial product that its use by bottlers was severely limited, and yet its potentials were recognized. Sulz commented on the new development and the methods of using it

in Germany for carbonating liquids—"If this method could be profitably adopted in this country it might bring about a radical change in the trade."

At the same time he pointed out that a German company, about two years previously (1886) had attempted to furnish the liquid gas to the American trade, for commercial purposes, "but failed by reason of the ignorance respecting the requirements of the carbonating industry here."

The unsatisfactory experiences of American bottlers in adapting the German product to their processes apparently interfered with its wide acceptance here. That delay was not too long, however. As previously noted, by 1888 Sulz was favoring its use and mentioned that the American Carbonate Company, of New York, had entered the field with an improved process for producing the liquid gas in a state of purity suitable for bottlers' use. And it was in that same year that another of the industry's major suppliers got its start through the pioneering efforts of Baur.⁵

JACOB BAUR AND LIQUID GAS

Jacob Baur (1856-1912) a graduate of the Philadelphia College of Pharmacy who became interested in the new subject of liquid CO₂, had recognized its commercial possibilities while manager of his father's drug store in Terre Haute, Indiana. During the first years of the 1880 decade he perfected a process for compressing and liquefying carbon dioxide and then decided to place it on the market commercially.⁶

A company was organized for that purpose, and in 1888 Baur and his associates began to manufacture in Chicago. Gas from combustion was used as the source, compressed and liquefied, and contained in steel cylinders. The company was then known as the Liquid Carbonic Acid Manufacturing Company, incorporated November 13, 1888. This later became the Liquid Carbonic Corporation. In May, 1889 the first cylinder of liquid compressed gas was shipped by the newly formed producer, for commercial use. As applied to the cylinder gas, the term "liquid" may not have been precisely correct, for much of the time it was kept under conditions where it could exist only in the vapor phase. Nevertheless, the term became one of common reference to the cylinder gas, and has persisted.

Other producers, also, soon entered the market. As early as 1893, in addition to the Liquid Carbonic Acid Manufacturing Company and the American Carbonate Company, the trade publications included advertisements of the Hecla Compressed Gas Company, of Boston; the Chicago Aeroform Carbon Company, the Carbon Dioxide and Magnesia Company, of Philadelphia; the Cleveland Nitrous Oxide Company; and the Michigan Aeriform Carbon Co. of Detroit.

Cost of the liquid gas was a factor in its use by the bottler, and then virtually all of them had equipment of some sort or another for producing the modest amount of gas they required. At the time of its introduction into the trade in 1886 the cost was about 25¢ per pound,

which was over three times what it cost to make it for their own use in their own plants.

Yet its use did increase, with the result that by 1906 as much as 50,000,000 pounds of liquid carbonic gas were being produced annually in the United States. And with this increase in its use, better and more efficient methods in its production, purification, and liquefaction developed. This helped to reduce cost, too, so that in a few years the market price dropped to 18¢ per pound. As Goosmann points out in his 1906 book *The Carbonic Acid Industry*, at this price it was possible to replace its competitor, the generator gas, which by that year had almost entirely disappeared from the bottling plants.

THE CHANGE TO COMPRESSED GAS

As Sulz summarized the situation in 1888, in addition to the better quality of soda water made with liquid gas in cylinders, its use simplified the manufacturing operation. Not only was no extra machinery required, but the labor and equipment needed for generating it were eliminated, as well as the cost and danger of handling the raw materials for producing it. "A bottle of the liquid gas, a mixing cylinder and a pressure-registering gauge are all the appliances needed. In fact, any style of carbonating apparatus can be readily adapted for using the liquefied gas," he commented.

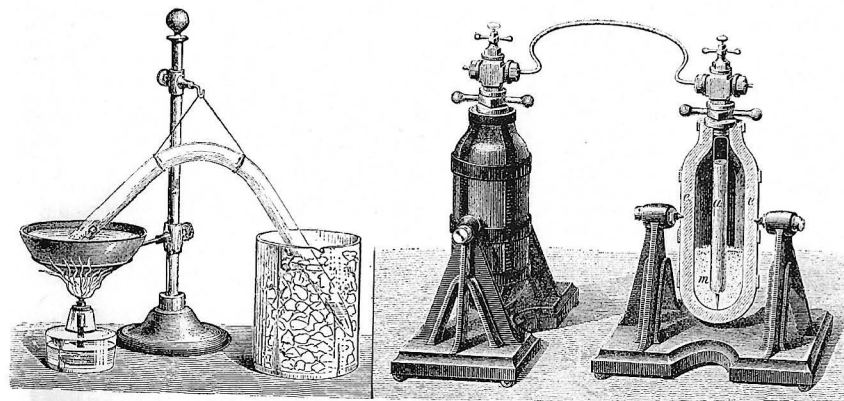
What Sulz there reported was unquestionably true, yet the complete transition required more than twenty years. Some progress in developing more effective generator-carbonating equipment had been made prior to the introduction of liquid gas. This included invention of the spray carbonator of Scannell, and the Witteman automatic carbonator, previously referred to. And by the early 1890's hand-operated gas generators in the bottling plants had been largely superseded by the power-driven types. Puffer, Tufts, Matthews, and the other equipment manufacturers were featuring them.

Improvements in English, French, German carbonating apparatus apparently received scant attention in the U.S., so progress continued at a slow pace, no doubt due in some part to the experimentation and attempts to adapt existing equipment to use of the liquid gas in the simplest and easiest way. And that presented its problems.

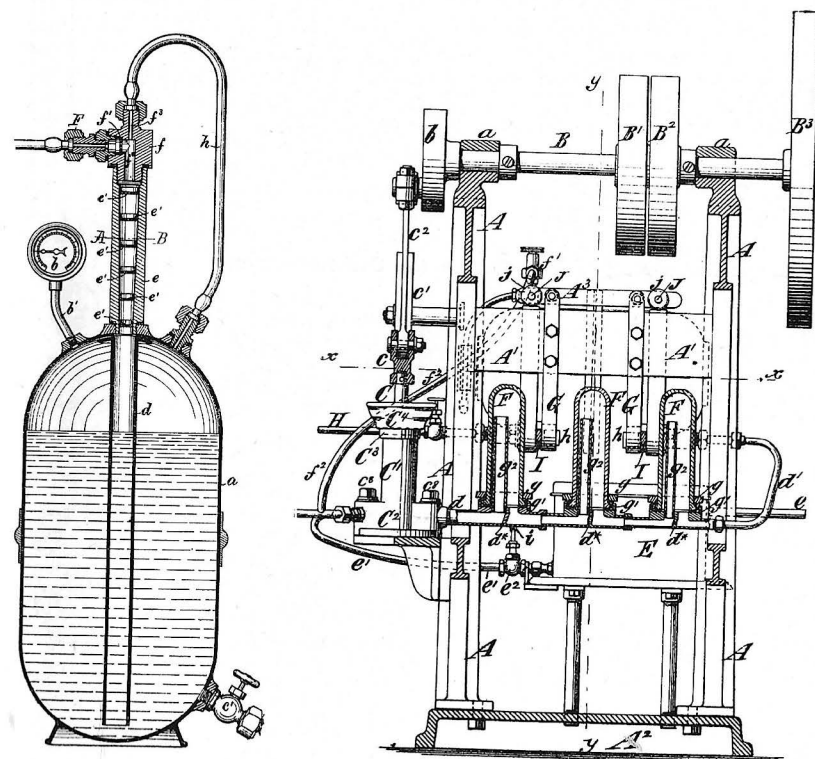
TRANSITION PROBLEMS

Goosman outlined some of them in 1906. For example, it seemed a simple matter to substitute the steel cylinder containing the liquid gas for the plant's generator, connecting the cylinder directly with the mixing tank known as the fountain, or carbonator. Experience soon taught that that could not be done satisfactorily due to the high pressure under which the gas was confined in the cylinder. Major difficulties were avoided by installing an expansion tank, or gas receiver, between the gas cylinder and the carbonator.

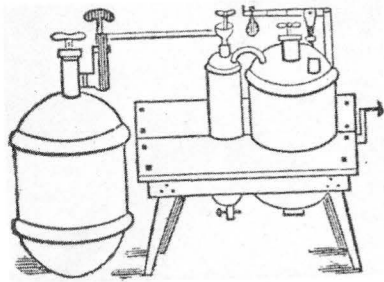
This worked better, but the need for more accurate controls of pressure soon brought the development of another type of regulator—



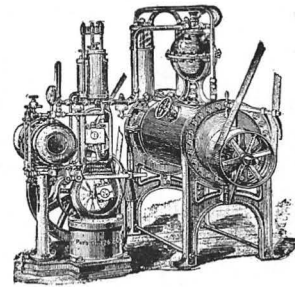
Faraday's Experimental Apparatus for Liquefying Carbon Dioxide—1823. Thilorier's Liquefying Device—1835.



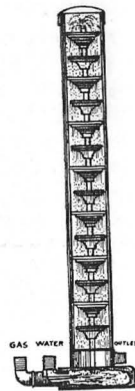
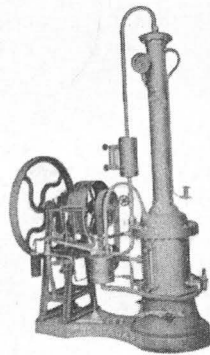
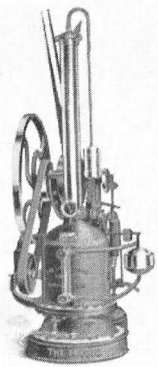
Early Patents on the Spray Carbonator (Scannell—1884; Robertson—1886).



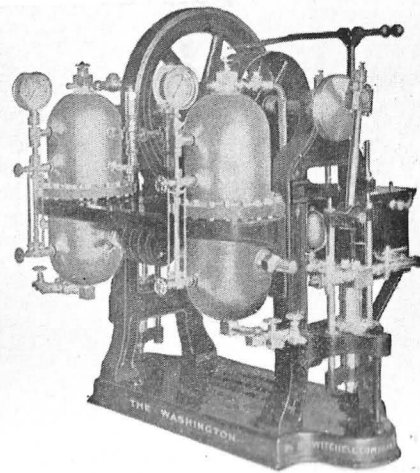
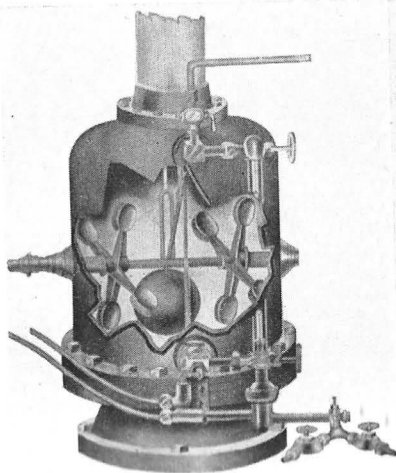
CARBONATING APPARATUS—1832



"SPRAY" CARBONATOR—c. 1890

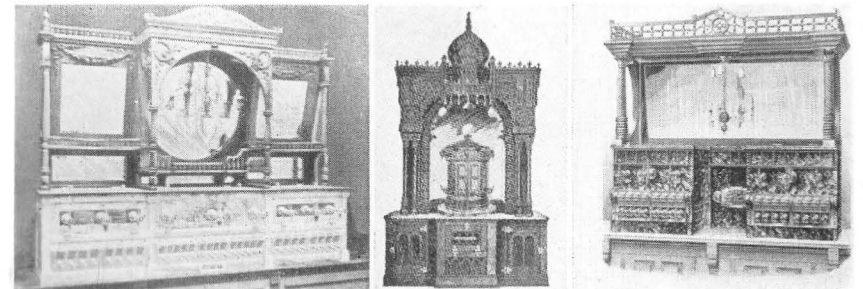
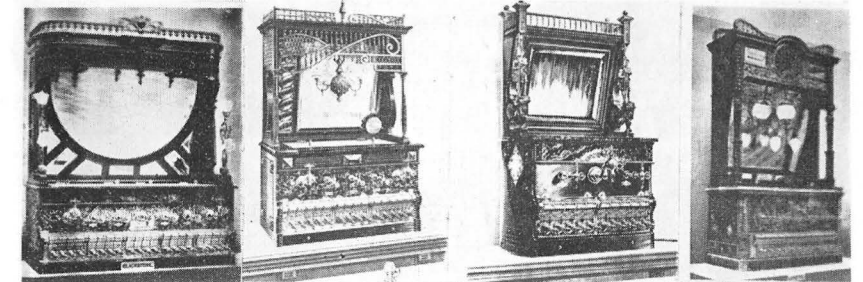
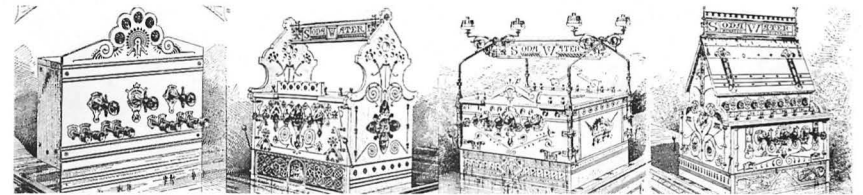
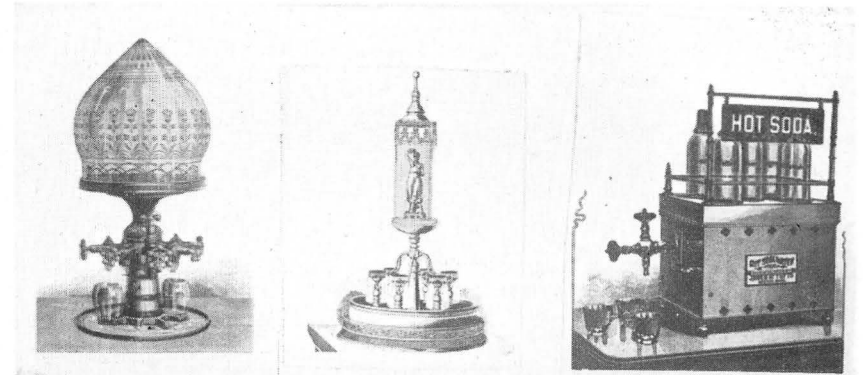


Magic Carbonator; Niagara Carbonator; Carbonator Spray Tower (Ferry).



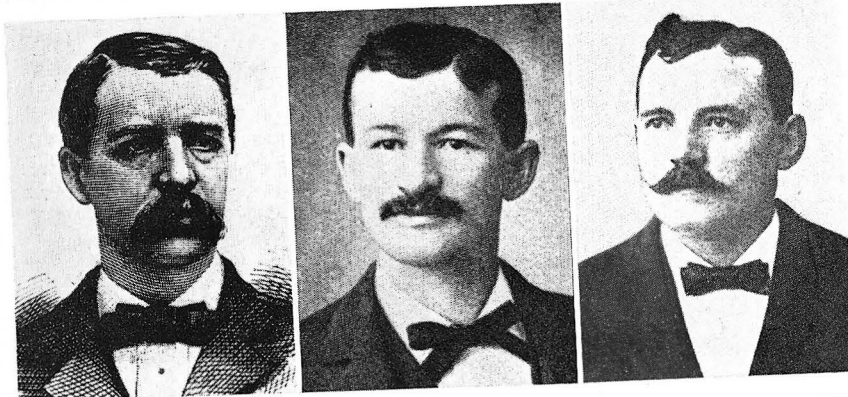
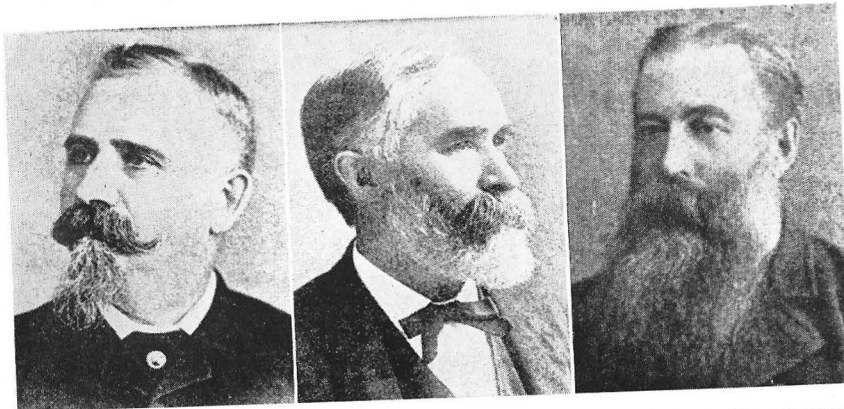
Carbonator Mixing Chamber (Eureka); Washington Carbonator.

NEW CARBONATORS FOR THE LIQUID GAS: 1890-1900



(1) The Drinkjoy (Matthews—1882); Maelstrom Tumbler Washer (Tufts—1893); Hot Soda Water Fountain (Tufts—1893). (2) Counter Soda Fountains (Matthews Models—1876). (3-4) Marble Fountains from Tufts Catalogue—1893.

SODA FOUNTAINS BEFORE 1900



Eben Seely, Brooklyn, N. Y.; Samuel C. Palmer, Washington, D. C.; D. U. Quick, Creedmore Bottling Co., Brooklyn, N. Y.; Henry Carse, Carse & Ohlweiler, Rock Island, Ill.; George J. Becker, Andrew Lohr Bottling Co., Cairo, Ill.; Charles J. Gruber, Gruber Bottling Works, Philadelphia, Pa.; Samuel Leidigh, Klee, Coleman & Co., Louisville, Ky.; John M. Silver, Superior Bottling Works, Superior, Nebr.; Frank A. Wegener, A. Wegener's Sons, Detroit, Michigan.

ACTIVE IN AMERICAN BOTTLERS PROTECTIVE ASSOCIATION: 1894-1918

the reducer valve. This assured proper pressure of the gas coming from its cylinder. Later, as the reducer valves were improved to more fully accomplish their purpose, it was found that the receiver was no longer necessary, and they ultimately disappeared.

As late as 1907, however, the old style of horizontal fountain, in which the water was saturated with the gas by agitation, under pressure, still had wide use. But the newer models of carbonators were being used, also, in increasing numbers. These included the shaker type, where saturation was accomplished by rocking or shaking the closed vessel containing the water and gas; the cascade (or spray) carbonators, where the water was sprayed or trickled through an upright cylinder filled with the CO₂; and the gas circulating types, with the gas being circulated through an upright cylinder filled with water.

Among those new developments which soon found use in the industry at the turn of the century was the "Cataract" carbonator of James W. Tufts and the American Soda Fountain Company; patented in 1893.⁷ In 1895 Tufts described the new carbonator as follows:

In this machine gas is admitted under high pressure to a vertical chamber, through a regulating valve which maintains a uniform pressure; by means of a pump, water is forced into the top of this chamber through a plate perforated with hundreds of tiny holes; and a revolving agitator in the lower part of the chamber completes the combination of gas and water. The quantity of water is governed by the action of a small vessel hung in knife-edge bearings and counter-balanced, the water flowing and ebbing in the vessel as its level varies in the mixing chamber, and gravity causing the vessel to rise and fall as its weight varies with the changing flow of water. The rock-shaft, upon which the vessel and its counterpoise are mounted, carries a belt-shipper, and its movement ships the driving belt of the pump from the fast to the loose pulley, and vice versa, thereby alternately stopping and starting the pump. The action of this machine is entirely automatic, and adapts its output to the demand made upon it by the bottlers, working equally well whether supplying one or six bottling tables. I have recently completed for the Charles E. Hires Company, of Philadelphia, a machine consisting of three of these carbonators mounted in battery with two generators of the largest size, which is capable of supplying eighteen bottlers and turning out 3600 dozen bottles of beverage in ten hours. This is probably the largest machine in the world for the manufacture of soda-water.

Tufts also manufactured another early model of carbonator called the "Reliable."

In 1894 the Liquid Carbonic Acid Manufacturing Company introduced its line of carbonators, involving the newer principles of carbonation. The "Magic" and the "Niagara" were the first of these. Bishop & Babcock Company, of Cleveland produced another known as the "Eureka." Twitchell sold the "Washington" carbonator. Most of these combined the spray and agitating features in the carbonating process. And there were others.

Introduction of liquid carbon dioxide was a major step in the progress of the carbonated beverage industry during the closing years of the 1800's. It simplified the manufacturing process. It made for a product of higher quality. And it eliminated forever any reason for consumers to be influenced against the industry's products on the grounds that they were "made from marble dust and sulphuric acid."⁸

10

Search for a Closure

POT OF GOLD

The few bottlers of carbonated waters and soda water in the United States prior to 1850 seem to have been very little concerned about a more satisfactory closure for their bottles. In England, numerous attempts were made in the earlier years of the 1800's to replace the cork with something better. In America the cork seems to have been taken for granted, and the difficulties of getting it inserted into the mouth of the bottle, and then wired or tied on, were accepted as normal problems.

But increasing activity in industry life beginning in mid-century was to change all that, although its full evolution required another half-century. During that period the search for the ideal bottle closure was like the fable of the pot of gold at the rainbow's end. The need was obvious. The expectation was that the reward would be fabulous. And the ingenuity of the American invention is evident in the scores of patents which were issued during each of the later years of the century for every imaginable means of stoppering the constantly growing production of bottled soda water. To keep its effervescent spirit safely imprisoned was the prime objective, but economy and ease of application were important, too.

To the serious historian of bottle closure evolution a study of each of the hundreds of various devices of the period 1850-1900 presents a challenge offering much of interest. But the purposes of this treatise are better served by viewing the half-century quickly, noting its principal happenings, and limiting the discussion to things which seem to have pointed the way to the eventual solution of the bottle closing problems—the era of the crown cap.

HENRY W. PUTNAM

In any discussion of closures for the soda water bottling industry the name of Henry W. Putnam has a natural and prominent place, for he was the recognized leader in the bottle closure field for many years—until late in the 90's. His business, done under his individual name, was at 108 Chambers Street, New York City.

Putnam's search for the ideal bottle closure, as an item which he could supply to the bottler, extended over a quarter of a century. First evidence of this interest is his patent of March 15, 1859, for a wire clamp device to hold the cork in the bottle. Fastened around the

exterior of the bottle neck below the finish, Putnam's wire fastener was on a swivel, permitting the clamp to swing off the bottle top so the cork could be pulled. It would appear that within a few years Putnam found his own device presented difficulties in use, so he produced and patented a means for removing it from the bottle. This, incidentally, was at about the time of his invention of the syrup gauge, which is said to have contributed much to Putnam's financial success.

During the 1860-1870 period Putnam's activity in the closure field increased, and he made claim to more than a hundred patents for a wide variety of bottle stoppers, some to be referred to later, yet his interest in the wire cork retainer continued, for as late as 1871 he patented a new machine for bending the wire in making it.¹

THE GRAVITATING STOPPER

Meanwhile, the search for something to supersede the cork was pointing in other directions, and the firm of John Matthews was active. John Matthews II, and Albert Albertson, who was associated with Matthews in some way, were using their inventive faculties in the development of an internal closure—something to close the bottle mouth from the inside, and to be retained inside the bottle. The Matthews gravitating stopper, so-called, was the result.

The first of the internal stoppering devices of Matthews and Albertson differed rather drastically from the gravitating stopper, for they used a metal spring inside the bottle to activate the closure. Albertson's first patent of this kind was in 1862, with others following in 1864;² that of Matthews was in 1865. Both of these early attempts show the influence of the siphon bottle, with their use of springs to keep the internal stopper in closed position.

Matthews, in 1864, also had patented a device for filling ball-stoppered bottles, showing familiarity with that type of closure at that early date.³ He did not think much of the ball stoppers, though, because they got out of shape, he said. So in 1865 he invented another type of internal stopper in the form of an elongated plug, to be pulled into closed position by a magnet. In that same year, too, he patented an apparatus for filling the internally-stoppered bottles in inverted position. His drawings show the gravitating type of stopper later to bear his name and patent.

Albertson, meanwhile, had made his approach to the same goal, for in 1864 he also patented internal closures quite similar to the Matthews stopper, as well as a filling apparatus for their use. The latter was made so the bottle could be swung from upright to inverted position during the filling and closing operation. This was one of the newer features of bottle filling with most internal stoppers, since the bottle had to be filled in upright position, then inverted so the stopper would gravitate into closed position, and be held there by the inside pressure when the bottle was removed.⁴

The net result of all this maneuvering seems to have been a joining of forces, for in 1866 the Albertson spring stopper patent of 1862 was reissued to John Matthews as assignee.⁵

The stopper which finally entered the trade as the Matthews gravitating stopper was patented in the name of John Matthews, Jr. in 1867.⁵ It appeared in the trade about that time, was favorably commented on (and illustrated) in the *Journal of the Franklin Institute* in 1868, and was a prominent item in the Matthews firm's catalogues during the succeeding decades.

Industry history fails to record any substantial success for the Matthews gravitating stopper. It does not seem to have been widely used, and this probably could have come from the more general acceptance of other types of internal stoppers then being introduced in increasing numbers.

THE BALL STOPPER

There is little evidence the ball type of inside stopper was widely favored at the time of the Matthews-Albertson activity. Yet the fact that Matthews was familiar with the type shows it may have been used to some extent.

The Codd type of internal ball-stopper, of glass, is of British origin, first used between 1870-1875. Hiram Codd, of Camberwell, England, patented his bottle with the ball closure in the neck of the bottle, in the United States, in 1873, but the Codd bottle did not gain any wide usage in this country.⁶ In England it was different. There the search for a closure covered a wide area, including screw tops, and a variety of internal stoppers such as wooden plugs, and stoppers of glass, rubber, and other materials.

Although the screw-type stopper ultimately became the preferred closure in the British trade, of all the internally stoppered bottles the Codd type was the most successful and widely used in that country for mineral and soda waters. In England its popularity extended from the late "seventies" until 1930, or later. It was used in Bermuda, as another instance, until the mid 1900's. And British trade influence in the Far East may also account for reports of its continued use in 1957 in Japan and India.

Certainly the floating-ball type of internal stopper, as distinguished from the glass-ball stoppered type of Codd, was popularized to a greater degree in this country through the efforts of industry suppliers. For example, S. Twitchell & Bro., of Philadelphia, even then one of the oldest suppliers of the bottler's needs, early in the later years of the 1880's introduced the new "Twitchell's Patent Floating Ball Stopper." These were made under the 1883-1885 patents of William S. Roorbach, a Philadelphia manufacturer of bottler's flavoring extracts.⁷

In general, the function of the Codd and Twitchell types of internal ball stoppers was quite similar to the Matthews device, the ball operating to close the neck of the bottle from the inside and being held in place by the internal pressure. In the Codd device the glass ball was held against a rubber gasket, while in the Twitchell closure the rubber ball was held against the glass side of the bottle neck and finish.

This type of closure lacked the protruding stem of the Matthews stopper and, as Twitchell pointed out in urging its advantages, this feature eliminated the dangers of its accidental displacement and loss of the bottle's contents. Other favorable features of the ball stopper were urged as sales arguments, too. It was claimed the bottles could not be used for other purposes, which was a serious problem. And the closure, being permanently inside the bottle, could not get lost.

But, as in the case of the gravitating stopper of Matthews, the floating-ball stopper seems to have made little headway toward general adoption. This may have been due in some degree to new devices making it easier to retain the old style cork in the bottle, and making wiring or use of Putnam's cork retainer unnecessary. The Bernardin type of cork retainer of the 1885-1895 period was one of the more prominent of these.⁸ The limited use of the floating ball stopper also was due in no small degree to the adaptability of the Hutchinson type of internal stopper, and the greater cleanliness permitted by the swing-stopper. Both of these gained wide popularity in the 1880's.

THE "HUTCHINSON" STOPPER

Internal stoppers of the Hutchinson type were numerous, but it was the specific one identified as "Hutchinson's Patent Spring Bottle Stopper," sold by W. H. Hutchinson & Son, of Chicago, which came to dominate the field. On this specific type of internal stopper, patent was issued to Charles G. Hutchinson, of Chicago, on April 8, 1879, and it was described as a rubber disk, attached to a laterally yielding flexible wire, or spring stem, approximating the figure 8 in shape. This was later changed to an elongated oval shape. The upper portion of the loop was sufficiently large to prevent the stem from falling into the bottle, while the lower portion could pass through the bottle neck to lower the attached disk from the opening.⁹

In the reverse operation, the rubber disk was pulled up by the wire stem to effectively close the bottle opening. In that position the stem extended above the mouth of the bottle. The bottle was opened by tamping the extending stem into the bottle neck, thus forcing the disk down from its closed position, which permitted the liquid to pour from the bottle.

The simplicity and low cost of the Hutchinson stopper gave the impetus to its wide adoption by a large portion of the growing soda water trade. It was economical, selling for \$2.00 to \$2.50 per gross. About 1890 the Hutchinson firm advertised that more than 3,000 customers were using the stopper; most of them were soda water bottlers.

The popularity of Hutchinson's stopper brought forth many competitive devices. Functionally they were about the same, and in general appearance there was very little to distinguish them. Prominent among these were the types known as the Klee and Miller stoppers, the one patented by John Klee in 1880, and the other by Joel B. Miller, in 1881.¹⁰ Rights to these two were controlled by the Putnam firm, of New York City, and as late as the mid-nineties the Klee and

Miller stoppers were being offered to the trade by Putnam. But the stopper of Hutchinson was also one of the items being sold by Putnam at that time, too. He covered the field.

And there were others. Charles Joly, of Philadelphia, sold his variety. J. A. Stukey Manufacturing Co. of Columbus, Ohio, advertised theirs as the "Stuckey Patent Spring Bottle Stopper." Berg-hausen Chemical Company, of Cincinnati, Ohio, advertised theirs as the double spring action stopper. Another, made under the patent of Amos F. Parkhurst, was litigated as an infringement of the Hutchinson patent, and in 1885 was held void by the Federal courts.¹¹

Stoppers of the Hutchinson type continued in wide use throughout the later years of the 1800's, and extended well into the 1900's. It became obsolete with the eventual adoption of the crown cork throughout the country, and a growing recognition of the undesirability of internal stoppers from the standpoint of product quality. Manufacture of the Patent Spring Bottle Stopper by W. H. Hutchinson & Son was discontinued in 1912.

THE SWING STOPPER

The popularity of the Hutchinson type of stopper during its long active life was shared to some degree with the swing type of stopper. It was well adapted to the needs of carbonated beverages, and also was widely used, but because of higher cost (\$3.50 to \$5.50 or higher, per gross) its principal use was for beer and ale. And it was this type of stopper which next attracted the energies and acumen of Henry W. Putnam.

Although many others were making claims to invention of the swing stopper, about 1880 Putnam began featuring one of his own. His first patent on this type was issued in September 1878, on an application he had filed the previous year.¹² Thus his introduction of the swing stopper was concurrent with the internal spring stopper of Hutchinson. But being of a radically different type, some of its disadvantages were avoided.

Putnam's swing stopper was essentially a plug or disk type of closure to fit over the top of the bottle, outside. The closure was linked to a loop of wire, which he called a yoke, and at each end the yoke in turn was linked to a lever member, also of wire. To obtain leverage necessary to hold the closure on the bottle, the ends of the lever member were fitted into "socket-fulcrums" formed on each side of the bottle top. It may be readily assumed that the necessity for special bottles with the "socket-fulcrum" in the finish put a severe limitation on the use of the device, for Putnam soon changed that. He provided the fulcrum, and swivel, by linking the lever to a bail firmly attached to the bottle just below the finish. This feature appeared in two other patents he soon secured; one in 1879, and one in 1880. This contributed to its wider use, for it could be attached as a substitute for the cork to almost any bottle then in use.

"LIGHTNING" AND "PHENIX"

As a stoppering device entirely outside the bottle, Putnam's swing stopper thus had the big advantage of easier cleansing, both as to the bottle and the closure. And its relative ease of attachment and operation suggested the name he gave it in offering it to the trade—the "Lightning" stopper.

Whether Putnam had patent problems with others at the time is not apparent. Yet it is clear that others were making the swing type of stopper even before Putnam's patent application of 1877. One of these was Charles De Quillfeldt, of New York City. His invention of a swing stopper can be credited safely to as early as an application he filed in November, 1874; patented in January, 1875.¹³ It embodied virtually the general principles of Putnam's 1878 patent, and to that extent anticipated it by a long period of time. Putnam later obtained control of the De Quillfeldt device, but in presenting it to the trade claimed only the benefit of a later patent of De Quillfeldt, issued in 1886, covering an improved model. Protection of patents issued to Frederick P. Morhous, of Bennington, Vt., in 1888, was also listed by Putnam in presenting this type of closure, which he called the "Phenix" bottle stopper.¹⁴

The Lightning and Phenix stoppers of the Putnam firm were aggressively advertised and promoted, and they were widely used, despite their higher cost. But this also served to increase the appearance of competitive closures of similar types, and they were numerous. The Joly Stopper Company, of Philadelphia, had two which it advertised as the "Mineral Stopper" and the "Royal Beer Stopper." The "Champion" was sold by the Lowell Stopper Company, of Lowell, Mass., and the "Keystone" by the Keystone Bottle Stopper Company, of Pittsburgh. The "Triumph" stopper of Painter, of Baltimore, was another in this category.

Truly the oft repeated critical comments of those times by Editor Keller of the *National Bottlers' Gazette*, on the multitude of stopper patents being issued each year during the later years of the century, were well justified. The situation was one of confusion and uncertainty, but it was continuing evidence of the need for a still better bottle closing means, so the search continued. And it was to be successful!

PAINTER AND THE "TRIUMPH"

William Painter (1838-1906) was born at Triadelphia, Montgomery County, Maryland, on November 20, 1838. In 1855 he became an apprentice at the factory of Pyle, Wilson & Pyle, patent leather manufacturers of Wilmington, and in 1867 was employed at the machine shop of Murrill & Keizer, of Baltimore. Painter had decided he wanted to be a mechanical engineer, and it was during his early period of employment that he started on his career as an inventor. His first two patents were issued to him in 1858, with eighty-three more U.S. Patents, and many more by other countries, to follow during his life-time. Certainly he became one of the most successful inventors his native State has ever produced.

Painter's inventions covered a wide range, for his ingenuity and his mechanical abilities were unlimited. Even in the closure field, in which he became interested late in life, the metallic bottle cap which became known as the "Crown" was not his first invention in the effort to solve that perplexing problem. He, too, recognized the practicality of the swing-type of bottle stopper being so aggressively promoted by Putnam and others. As early as November, 1884, for example, he had invented one of that type, with improvements in the leverage device and clamp securing it to the bottle top. A patent on it was issued to him on April 14, 1885.¹⁵ When later placed on the market it was known as "The Triumph" bottle stopper.

THE "BOTTLE SEAL"

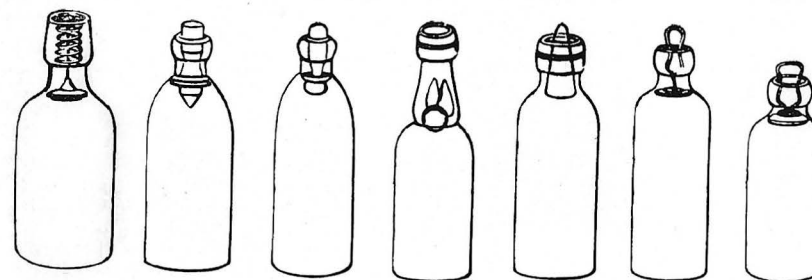
Then, on August 11 of that same year, he patented a new method of preparing the plug, or disk, used for that type of outside stopper.¹⁵ It was made of a combination of rubber and fabric, chemically treated for protective purposes.

More important, however, was his 1885 invention of what became known first as the "Bottle Seal," and on which patent was issued to him on September 29 of that year.¹⁶ For this new device Painter adopted the simple expedient of a disk of rubber or other flexible material as the closure, its bottom surface being convex shaped. With the disk fitting tightly into a groove circling the inside of the bottle neck, internal pressure exerted on the convex surface resulted in lateral pressure of the closure against the bottle neck, holding the closure firmly in place.

In its earlier form the Bottle Seal was designed so that it could be removed by a tab attached to its edge, or by puncturing it in the center with an opening tool. Later one of the modifications anticipated in the patent was substituted, and the disk was made with an imbedded wire shank looped on its outer end. The loop was for insertion of a hook or pointed instrument to pull the seal from the bottle mouth. With this change it was called the "Loop Seal." The Baltimore firm which Painter had organized in 1885 to make and sell the closure, however, continued to be known as "The Bottle Seal Company."

In describing his new device, Painter pointed out that it was his purpose to avoid the disadvantages of the Lightning and the Hutchinson types of stoppers. He held the higher cost of both stoppers, the inconveniences incident to their use, and the liability of their accidental displacement with loss of the contents were the things his invention would overcome. And, particularly in comparison with internal stoppers, the bottle cleaning problem would be greatly simplified by his new seal because it was a single-use closure, to be discarded when the bottle was opened.

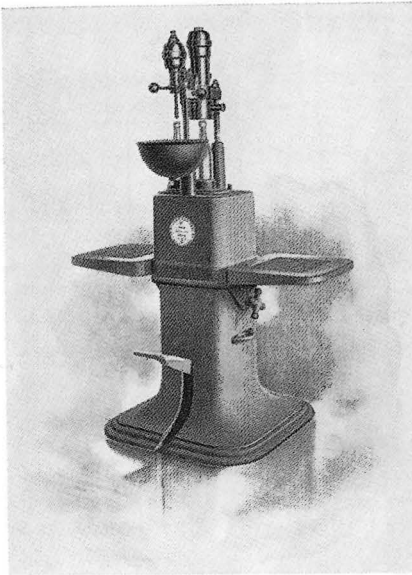
It was a novel development. It greatly advanced the progress of sanitary measures in the bottling process. And it was economical. The price was 25¢ per gross. But a special machine was needed for its use in the bottling operation. This Painter also provided for by



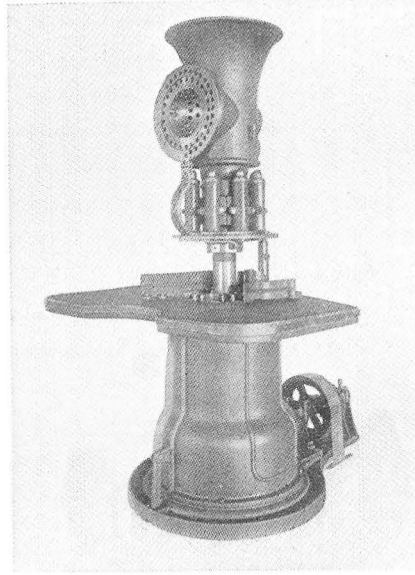
Internal Stoppers—1883.



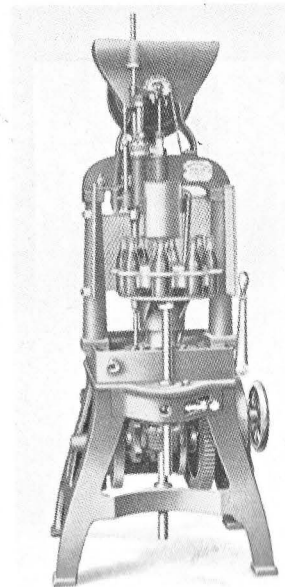
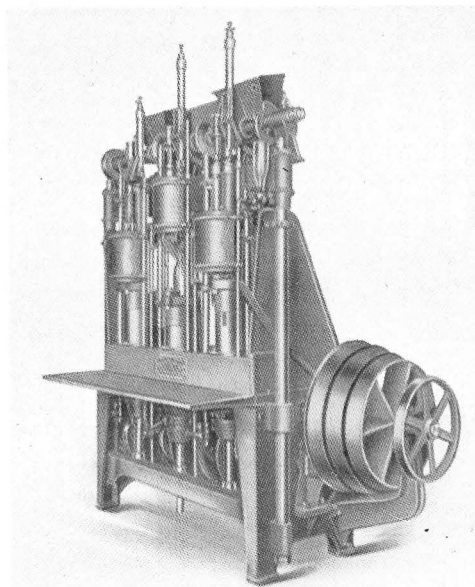
(1) Cork; (2) Cork Fastener—1857; (3) Matthews Gravitating Stopper—1865; (4) Codd Ball Stopper—1873; (5) Lightning Stopper—1875; (6) Hutchinson Stopper—1879; (7) Klee Stopper—1880; (8) Bernardin Bottle Cap—1885; (9) Joly Stopper—1885; (10) Twitchell Floating Ball Stopper—1885; (11) Bottle Seal—1885; (12) Crown—1892.



First Syruper Crowner—1893.



First Rotary Crowner—1898.



Automatic Power Crown Soda Machinery—(1) Senior, (2) Junior; 1907-1911.

MECHANICAL PROGRESS IN FILLERS-CROWNERS: 1893-1911

his invention of a new filling and sealing machine which sold for \$75.00 (foot power). By 1888 over 100 were in use. He patented the machine in October, 1890. The seal and the machine for its use opened a big future for Painter and his company and for the soda water industry. But even more startling changes were in the making, induced no doubt by competitive difficulties which were now adding to his problems. These included threats of litigation based upon conflicting patent rights.

In the *National Bottlers' Gazette* for November, 1891, for example, a full page advertisement of the Bottle Seal Company announced that it would protect and hold harmless all of its patrons in any patent infringement suit brought against them by The De La Vergne Bottle and Seal Company of New York City. On the opposing page another full-page notice of the latter announced that it would prosecute infringers of patent rights it had secured covering a similar seal. The De La Vergne firm owned patents on a similar bottle seal invented by Ernest W. Clemens, and on a sealing machine invented by Albert Siebert, both of New York City. Patents covering the inventions of both had been issued in 1891.¹⁷

Protracted litigation seems to have been avoided, however, and very likely because Painter realized his Bottle Seal still was not the best solution of the closure problem for the bottling industry. This was one of his incentives for continued search for a better stopper. And he did have other ideas, for during the period 1889-1891 he filed applications for patent protection on an entirely new approach to the solution of the bottle stoppering problem—a metallic disk, with a cork liner, to be securely crimped on the bottle top.¹⁸

THE "CROWN"

The first form of Painter's new bottle cap shown by his drawings of November, 1889 now appears to have exaggerated the difficulties of keeping it attached to the bottle top, and of removing it. As to the former, the new closure featured a long skirt, rather deeply crimped in a depression below a new locking ring on the bottle top. To help in its removal, the first model had a loop stamped in its top surface, for the opening instrument. And its very nature must have suggested the name "Crown," a term so appropriate that it became generic.

The loop in the new closure seems to have permitted leakage through the cork liner, so in his second form of the closure (1890) Painter eliminated the loop. He found that extending the edge of the skirt outwardly to a slight degree provided a way of prying the cap off the bottle. Strength was added to the skirt for that purpose by making it shorter. The heavy cork disk liner was retained to avoid possible leakage, against which further protection was sought by forming the lip of the bottle top with an angular edge which would be impressed into the cork when the closure was affixed.

By 1891, however, Painter had found the features of his metallic cap and the method of attaching it to the bottle so effective that leakage was no longer a major problem. This made it unnecessary for

the cork liner to be made as heavy as before, and it was made thinner. The angular surface of the bottle lip was eliminated also, so that the closure rested on a rounded surface, which was found satisfactory. Thus the crown cap took on substantially the form in which it has existed since that time.

On February 2, 1892, patents were issued to Painter for all three of his 1889, 1890, and 1891 versions of his new bottle closure, and shortly thereafter the new capping machine which he had developed for its use was also patented by him.¹⁹

Then, on April 1, 1892 the Crown Cork and Seal Company was organized as a stock company, capitalized at \$1,000,000, as the successor of The Bottle Seal Company. Joseph Friedenwald, of Baltimore, became the corporation's President, and William Painter was elected Secretary and General Manager of the new company. He retired from the company in January, 1903; death occurred July 15, 1906. Painter's 85th and last U.S. patent was issued May 19, 1908, covering one of his machines for manufacturing the crown he invented.

CROWN TRANSITION PERIOD

The manufacturers of the new bottle crown did not have an easy job selling their closure to the bottling industry. For one reason, there still was plenty of competition with the other closures already in the trade. Corks continued in wide use, and were consistently advertised by such suppliers as Hugo Cahn & Co., A. Stephani & Co., and Truslow & Co., all of New York City. Armstrong Bros. & Co., Inc., of Pittsburgh, the Cincinnati Cork Company and the Williamsburg Cork Works, of Brooklyn, also were in the field.

And then there were the other types of popular closures—the Hutchinson stopper, and those sold by Matthews, and by Putnam. Other closure suppliers, located in New York City, included the Climax Stopper & Bottle Co., Karl Hutter, and Louis Quitman. S. Twitchell & Bro., Berghausen Chemical Company, J. A. Stukey Manufacturing Co., and the Perfection Bottle Stopper Company were others, also distributing their types. They were a few of the advertisers to the trade.

The crown manufacturer provided the bottle makers with the necessary tools with which to form the necessary finish on new stocks of bottles for the bottlers switching to the crown cap, but the change-over process was long and tedious. In the early 1900's there were more than 50 of such bottle manufacturers.

The crown type of closure represented a major milestone in the progress of the bottled carbonated beverage industry, but it was to be many years following its first introduction in 1892 before complete transition to its use was completed. Substantial use of the new closure by soda water bottlers did not get started until about 1897. By 1902-3 less than 20 bottling plants in the New York City area were using the new crown. The older "Loop Seal" was in vogue to a degree; the manufacturers advertised in 1904 that annual use of it exceeded 200 million and, in addition, an effort was being made to popularize their aluminum stoppers.

11

Bottles and Their Manufacture

EARLY TYPES

Glass blowing has been recognized as the first American industry. The second ship to arrive at Jamestown, Virginia brought eight skilled glass workers who, in 1608, under Captain John Smith, built four furnaces nearby. These were used to make vials, bottles, drinking glasses, and glass beads for trading with the Indians.

Despite the mechanical progress being made in other fields during the first half of the nineteenth century, however, little impetus was given to mechanization in the production of glass bottles. The small proportion of soda waters sold in bottles, compared with the predominance of fountain dispensing, provided no such incentive. But that did come with the advent of the crown cap type of closure.

From the time of Silliman's difficulty in procuring bottles for his 1807 operation in New Haven, and his request to Trumbull in New York to provide him with some of the bottles in which mineral waters were imported from Europe, until mid-century we have little indication either as to the types of bottles used for soda water in America, or the extent of their supply.

It seems not unlikely, however, that the egg-shape bottle of early English origin had a prominent place in the bottling of the American products, whether unflavored or flavored, of that period. And no doubt the earthenware, or so-called stone bottle, was widely used. Both of these early types continued in use to some extent until the coming of the crown cap. Early in the 1900's the stone bottle was the popular container for the hop beer, birch beer, and spruce beer types of soft drinks. Modifications of both types continued even after that time, and to a limited extent are currently used.

SODA WATER BOTTLES

In the middle 1800's, however, use of the cork as the universal closure for soda waters tended to standardize the finish of bottles made for them, whether the stone bottle, the egg-shape, or the then popular soda water shape of 6-7 oz. capacity. The soda water shape of bottle appeared in virtually every instance where the industry's use of bottles was illustrated during the 1850-1865 period. The finish, of course, was typified by the heavier mouth portion of the bottle (or reinforcing ring) extending approximately an inch from the lip of the bottle.

During the succeeding twenty-five year period, however, a multiplicity of bottle sizes and shapes resulted from the increasing competi-

tion for trade, and from the special requirements of the many new stoppering devices. As to general sizes and shapes, Sulz comments: "For bottling ordinary saccharine beverages half-pint bottles are used, shaped in various forms. For different beverages often different shapes are employed, as for instance ginger ale. No rules, however, are applicable. It is always optional with the carbonator, who strives to please the fancy of his customers. Pint bottles and quart bottles are employed also for various drinks; champagne bottles for fruit champagnes, etc." Most of them, of course, bore the paper labels of the individual bottler.

The wisdom of Sulz's added recommendation, that the trade would be much better off if a uniform bottle in size were adopted, is shown by an illustration in the *National Bottlers' Gazette* of the 1890's, illustrating the many sizes and styles of bottles being offered to soda water bottlers of that time.

Most of the beverage bottles prior to 1880 were in various shades of light green. This was due to the presence of iron and sometimes other foreign materials in the glass batch, which imparted a bluish green tint. Darker shades of green and amber were sometimes made by adding certain colorants. However, glassmakers had not yet learned how to make perfectly clear glass in large quantities.

Decolorizing agents for making clear glass came into use about 1880, but the problems were many, and because of the difficulties the clear or "flint" glass bottle was not widely used for many years.

The ancients experimented with the production of color in glass by adding metals to the mix of raw materials. During the later years of the 1800's, American glassmakers threw gold coins into the batch to produce a ruby red glass; results came largely from trial and error. Not until well into the Twentieth Century did the use of color in commercial glass manufacture become an exact science and permit the manufacture of colored bottles in quantity.

These developments eventually made possible the popular flint glass, emerald green, Georgia green, and amber bottles of the later decades.

The variety of bottles used prior to 1900, and the limitations on their production due to the methods then in use, meant that the sources of supply were many, for the glass plants also were relatively small. Some indication of this is given by the advertisers of bottles in the trade press of the nineties.

The Pittsburgh area led the field, with the American Glass Works, D. O. Cunningham (established 1849), Cunningham & Co., and C. L. Flaccus Glass Co., while in Philadelphia were the Cohansey Glass Manufacturing Co., and the Whitney Glass Works. Located in New York City were Hagerty Bros. & Company and Philip J. Hahn & Son; in Brooklyn was the Hagerty Glass Works. The Maryland Glass Manufacturing Company was located in Baltimore, as was Swindell Brothers. Others included the Scranton Glass Co., of Scranton, Pa., Queen City Glass Co. of Cumberland, Md., the Hawley Glass Co. of

Hawley, Pa., Olean Glass Co. of Olean, N. Y., and the Cream City Glass Co. of Milwaukee, Wisc.

The popular siphon bottle of the time had numerous suppliers, with virtually all of them located in the New York City area. These included Bennett & Gompper, Brooklyn Apparatus & Siphon Manufacturing Co., Fensterer & Ruhe, Koscherak Brothers, John Matthews Apparatus Co., and the N.Y.B.S. Manufacturing Company. Barnett & Foster, of London, England, also advertised the imported siphon; they had a New York office.

BOTTLE MAKING MECHANIZED¹

Prior to 1880 the domestic manufacture of glass, including bottles, was a small plant operation and progress toward mechanization of the procedures was much slower than in other fields, for there were many difficulties to overcome. Mixing of the batch was done by hand as late as 1880, and the problems presented by variables in the materials used required expert attention.

The matter of heating the batch, also, put limits on the methods of production, and it was not until the use of gas-fired furnaces about 1870 that this was overcome in substantial degree. Although gas had been used previously in German glass production, it came later in this country. And it was a major step, for it made possible the ultimate change from the old type of furnace with the pot system to the continuous type furnace for melting glass. With the latter the raw materials went into one end of the furnace, while the molten glass was drawn from the other end. This, of itself, was progress toward full mechanization.

Until about 1892 practically all bottles manufactured in the United States were hand-blown. By that process, requiring a high degree of skill, the blower dipped the end of his "pontil," or hollow steel tube, into the pot of molten glass. By rapidly revolving the tube, he gathered the "gob" of molten glass on the end, and then proceeded to "blow" the "gob" into a bubble shape. This was followed by a rolling of the molten bubble on a slab where, still on the pontil, it was worked into a suitable shape for the mold. Then, with the partially shaped hollow mass inserted into a hinged iron mold, the latter was closed and the molten bubble blown to its finished shape within. The pontil was then cracked off, and a finishing tool used to form the neck and lip of the bottle. The annealing process followed. By this method, in a 12 or 14 hour work-day, the total output of the bottle blower and his four assistants rarely exceeded 18 dozen bottles.

THE OWENS MACHINE

During the period 1892-1904 several machines for making bottles were developed, and some of them were put into successful operation in a limited way. But the form of the narrow mouth bottles, such as those for soda water, presented such difficulties that mechanical operations were possible with only some of the procedures and not the complete production.

Michael J. Owens, of the Toledo Glass Company, Toledo, Ohio, for example, in 1895-98 invented and patented mechanism for blowing the molten glass in its mold,² but after the removable blowpipe with its gather (or gob) had been manually placed in the machine by the operator. The wide-mouth ware did not present the same difficulties, and semi-automatic machines were successfully used for producing it during that same period.

However, beginning in 1899 Owens worked on the construction of his completely automatic bottle machine and by 1903 he was wholly successful. In 1903 he filed his application for patent, and U.S. Patent No. 766,768 was issued to him on August 2, 1904, with the Toledo Glass Company as assignee.

From the introduction in 1903-1905 of the Owens automatic machine, until 1917, his was the only fully automatic mechanism for the making of all kinds of bottles. These included the wide-mouth ware used for jams and jellies, and the narrow-mouth bottles used for soda water. Soft drink bottles were first produced on it in 1907.

The Owens machine made quick progress in the glass-making field in the United States, for with but eight machines in use during the years 1905-1906, by 1917 the number had increased to 200. It comprised a number of working units, mounted on a circular, rotating framework. Each of the units included the bottle blowing mechanism and the mold which, as a part of the operation, was immersed in a revolving pot of molten glass to receive the necessary gob. With every revolution each unit completed a bottle ready for thelehr. From the tank through the lehr, no hand work on the product was required. It was completely automatic.

The Owens bottle machine was recognized as the major advance in the art of glass manufacture since the blow-pipe was first used 2,000 years before, and revolutionized the bottle-making industry. For the users, such as the soda water bottler, it was a major development, also, for it not only made possible a substantial reduction in the cost of his bottles, but paved the way for production of the tremendous quantities of bottles required for the rapid expansion of his industry during the twentieth century.

THE "GOB" FEEDER

In the Michael Owens automatic machine, and in the semi-automatic machines of other producers, the method of feeding the molten glass presented a major problem. Available feeding methods were unsuited to the advances made in other features of the equipment. By 1917, however, devices which permitted the molten glass to flow directly from the continuous furnace to the bottle machine, variously called the "flow and feed" or "gob feeder" methods, were successful. With this improvement, during the years which followed other machines were used in increasing numbers, and after 1917 the predominance of the Owens equipment declined considerably. Nevertheless, the Owens bottle machine is still in wide use in the bottle-making trade.

12

Progress in Bottle Washing

A HAND OPERATION

Suitable cleansing of the used bottles returned to the soda water plant during the infancy of the industry must have been a difficult matter. From its earliest days and through most of the later years of the 1800's there is little evidence of any high degree of mechanization, for one thing. It was largely a hand operation.

Even in the later years of the century such progress as was made was limited primarily to the use of a brush mechanism, operated by foot or by steam power, for internal cleansing of the bottles. In some instances "shot" was used for internal scouring of the difficult ones; a shot machine was available for that purpose. Soaking and rinsing, also, were largely hand operations, although mechanical devices of a sort did eventually appear as steps to the mechanical era in bottle washing.

EARLY INVENTIONS

Yet this does not mean that there was entire lack of effort to hasten the process, by those who recognized the labor-saving possibilities of mechanical washing and its greater effectiveness from the standpoint of sanitation.

One of the earliest inventions to that end, although not directed specially to soda water bottle cleansing, was that of Keene A. Bille, of New York, N. Y., patented November 8, 1828.¹ No copy of the patent being available, we are limited to a description of the device as given in Vol. XII, *Journal of the Franklin Institute* for 1829 (p. 118):

In the operation of cleaning, the bottles are to be placed upon shelves, in an inverted position, their necks passing through holes made for that purpose. Under the neck of each bottle there is a tube standing vertically, its upper end being perforated, so as to throw out numerous jets of water. The lower ends of these tubes are connected to a common reservoir of water, which may be forced from it under a sufficient head, or by a forcing pump. There is an apparatus for lowering the shelves, so that the tubes may pass into the bottles and reach nearly to their bottoms. When so situated, the water is let on, and rushes into the bottles, which, during the operation, may be raised and lowered by the motion of the shelves.

Bille's device, obviously, anticipated by many years the actual use of the multiple jet rinser which later was found in bottling plants, and his use of the movable shelf involves some features of the bottle pockets of the mechanical washers of a much later period.

It was many years before the needs of the situation seem to have encouraged serious activity, for it was not until 1849 that a simple device was invented and patented by Munson C. Cronk, of Auburn,

New York. It involved the use of tub and pump to apply hydrostatic pressure to the cleansing of mineral water and beer bottles. It is of interest as indicating the status of the art at that time.²

HYDROSTATICS AND BRUSHES

More advanced in design was one a few years later (1854), invented by A. H. Rauch, of Bethlehem, Pennsylvania for the mechanical brushing, inside and outside of the used bottles.³ Rauch explained, in his application for patent, that the machine could be operated by hand, or by connection with a steam engine. And in its mechanical arrangements for the holding of the bottles, revolving them for the brushing inside and outside, and the water supply and drainage connections, it was undoubtedly far ahead of its time. Despite favorable comment on the Rauch machine in the *Scientific American* of May 21, 1853, it seems to have made little headway in the bottling plants of those days.

The relatively crude state of the bottle washing process actually used as late as 1876 would seem to be fairly illustrated by the catalogue of that year of the Firm of John Matthews, for it offers the "Matthews' Bottle Washing Machine"—a single jet, with a water pressure adjustment—with this comment:

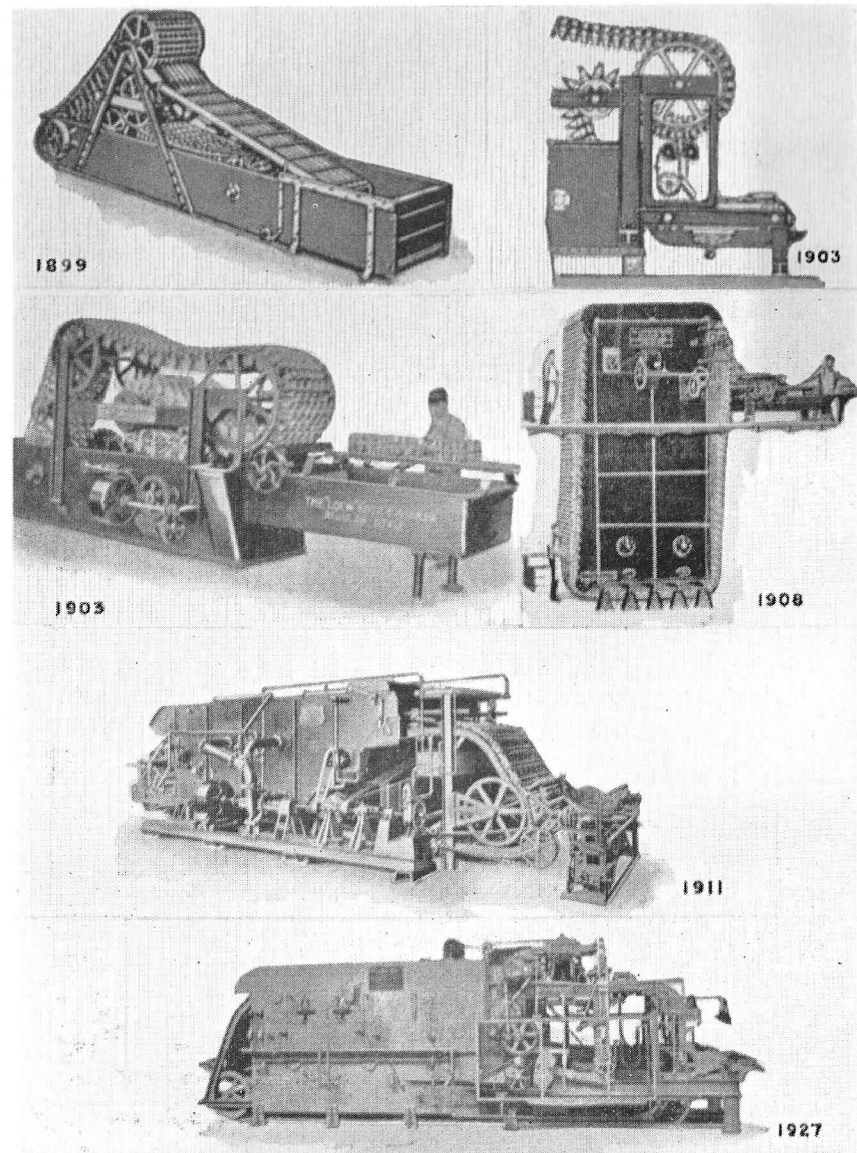
This important department of the business is at present much neglected, the appliances generally in use being of the rudest description. Ample troughs partitioned, abundantly supplied with clean water, should be provided in every bottling establishment sufficient to contain all the empty bottles as fast as received. Bottles when empty should lie in water in these troughs. The bottles should all be rinsed with clean water before using them. This is best accomplished by the use of Matthews' bottle washing machine.

This machine supplies to each bottle a jet which effectually rinses it. It can be used only where there is a water pressure. The set screw and spring can be moved and set so as to adapt the machine to any pressure of water. When properly adjusted, the slightest pressure of the bottle mouth on the lever will inject the bottle with water sufficient to cleanse it.⁴

THE MECHANICAL SOAKER

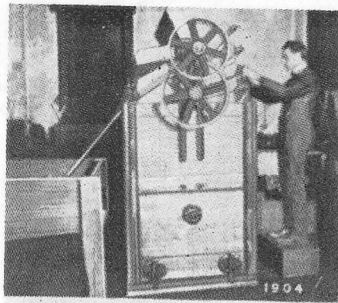
The bottle washing process thus outlined by Matthews, and the simplicity of the single jet rinsing device which he was offering to the bottling trade, may be compared at this point with a rather novel soaking mechanism which made its appearance in British bottling plants during the 1880's. In these devices a drum, comprising pockets in which the bottles were placed, revolved on an axle to carry the bottles it contained through the soaker tank in which the lower portion of the drum was immersed.

One of this type, the "Triumph" bottle washer, made under the Horner patent, was advertised for sale in this country about 1886 by the Triumph Bottle Washing Machine Co. of Boston, Massachusetts.⁵ In it the bottles were placed in side pockets, six wide; its stated capacity was 150 dozen per hour. Horner's patent shows brushing, rinsing, and soaking mechanism as an integral part of his machine, and it is described as a "machine for automatic soaking, brushing, and rinsing bottles." As such, it was obviously many years ahead of its time in the American trade.

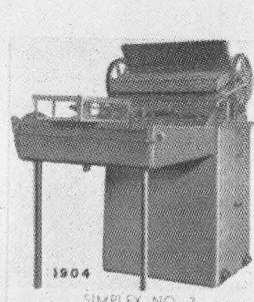


EVOLUTION OF BOTTLE WASHING EQUIPMENT: 1899-1927

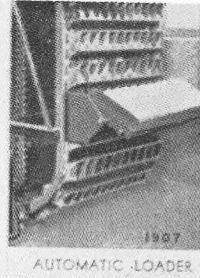
From Catalogue of The Liquid Carbonic Corporation



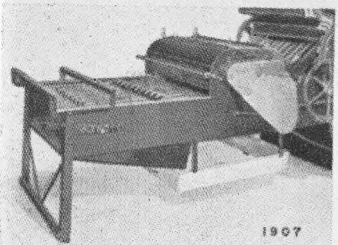
THE FIRST SIMPLEX SOAKER



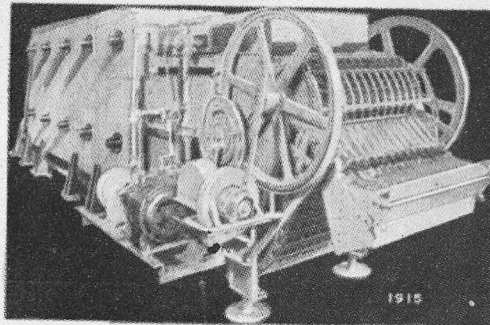
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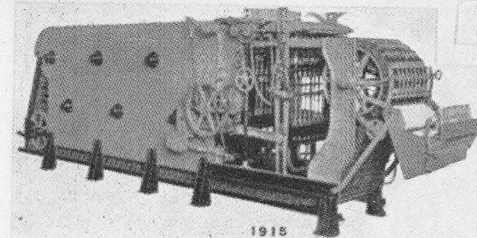
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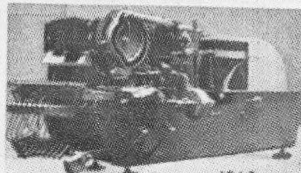
NO. 1A DOUBLE BRUSH CONVEYOR



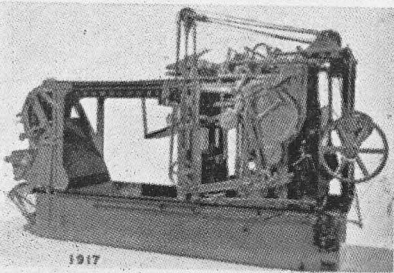
FIRST COMBINATION SOAKER AND HYDRO WASHER



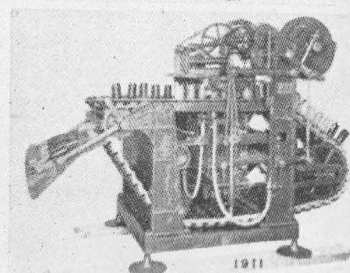
FIRST COMBINATION SOAKER AND BRUSH WASHER



FIRST ONE END LOAD AND UNLOAD BOTTLE CLEANER

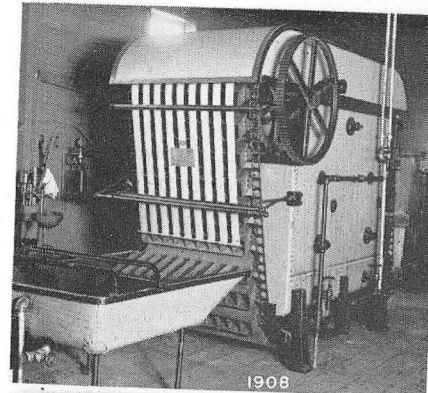


THE FIRST ONE END LOAD AND UNLOAD "DUMORE JUNIOR"



NO. 1 PROGRESSIVE WASHER

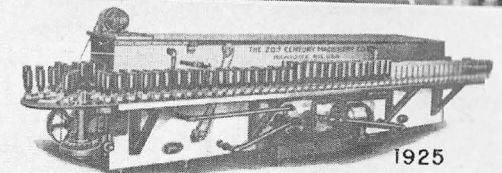
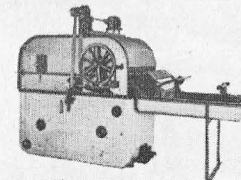
CLIPS FROM MEYER'S "40 YEARS OF PROGRESS: 1904-1944"



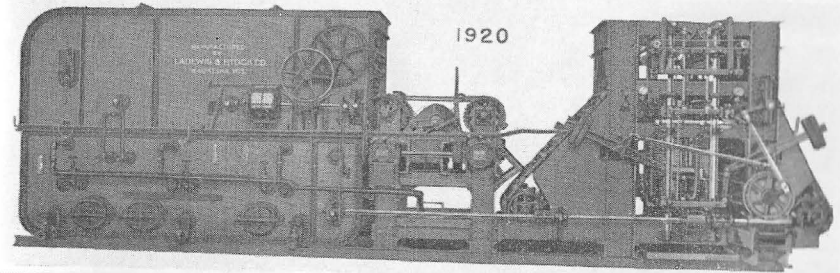
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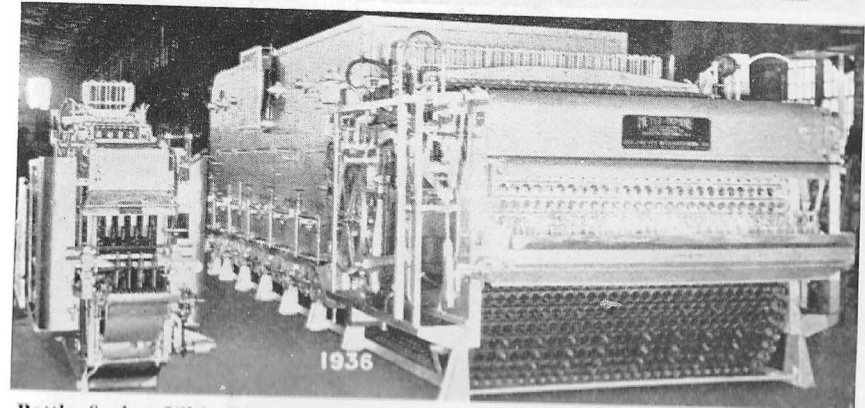
1920



1925



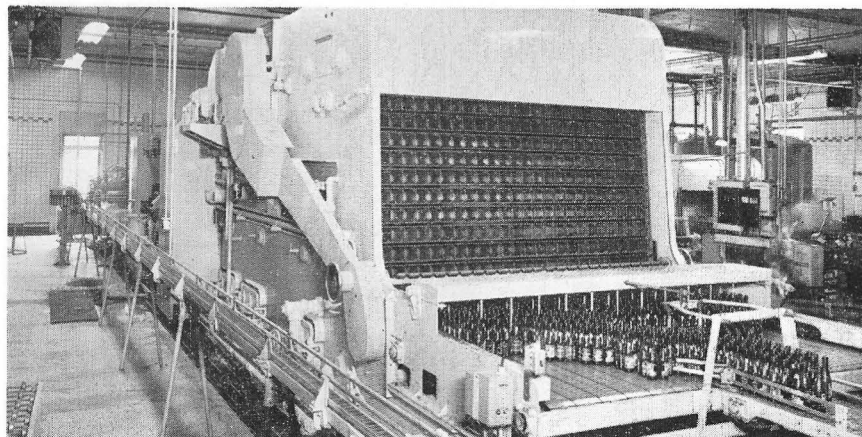
1920



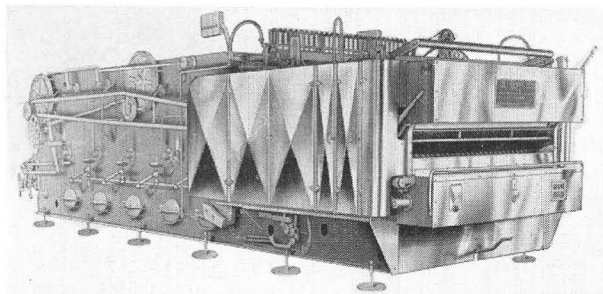
1936

Bottle Soaker With Rinse Pan (Barry Wehmiller); Rotary Hydro Bottle Washer (Miller); One Compartment Soaker (Yundt); Rotary Hydro Bottle Washer (20th Century); Hydro-Pneumatic Bottle Washer (Ladewig & Stock); 4-Wide Dumore Junior and 28-Wide Dumore (Meyer).

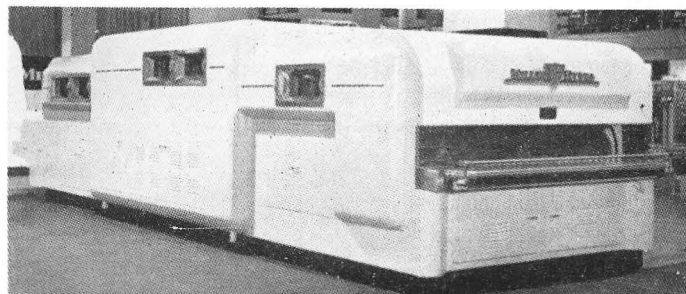
PROGRESS IN BOTTLE WASHING EQUIPMENT: 1908-1936



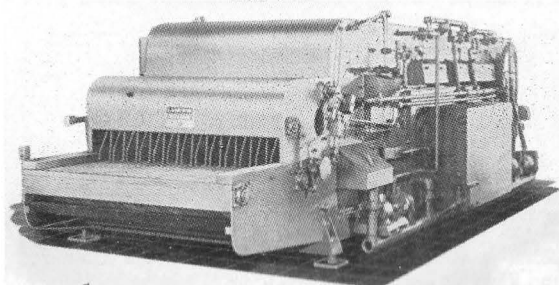
Above
Barry-Wehmiller



Right
Meyer Dumore



Above
Miller-Hydro



Left
Ladewig

SOME MID-CENTURY BOTTLE WASHING EQUIPMENT

The other, illustrated in Sulz's treatise of 1888, was a soaker having the bottle pockets in the axle end of the drum or wheel. It also was of British manufacture and made, according to Sulz, under "Wilson's patent."

Although both of the foregoing involve some of the principles of the tank type of mechanical soaker of a later period in this country, during the 1880's and the 1890's they seem to have found little favor with the American soda water bottler. Whether this was due to high cost, difficulty of supply, or the bottler's preference for the smaller domestic equipment for his size of plant is not a matter of record.

BOTTLE WASHING IN THE 1880's

In the early years of that period the method used here is shown by this comment of Sulz: "It is absolutely imperative that the bottles be soaked in hot water, softened by the addition of some soda or potash, to remove old labels and also to soften the fungus or dirt inside. The bottle must then be brushed out by the revolving brush, and at the same time the outside cleaned by the operator rubbing his hands over it. The next operation is placing the bottle on the rinser; the water being turned on by means of the cock, when it rushes with great force against the inside of the bottles, which can now be taken off, and should be packed in boxes, neck downward, to drain; or they may be drained first, by placing them in holes in a tray on top of trough and then laid in boxes for filling or may be left a few minutes on the rinser to drain."

The revolving brush type of washer was something new since the Matthews catalogue of 1876. Although the brushing machine was operated by foot power, or by steam power, the placing of the bottles on the brush, after they had been taken from the soaking trough, was still a manual operation. Then, still by hand, they were placed on a reservoir rinser, with multiple rinsing jets, for final cleansing and for the bottles requiring a more drastic internal scouring, lead shot was used to remove the foreign substances. This was termed "shotting."

In the trade papers of 1888 these brushing devices were offered to the trade by such firms as Chas. Lippincott & Co., Philadelphia; A. D. Puffer & Sons, Boston; Yawman & Erbe, Rochester (the Improved Goulding Bottle Washer); and Hoyt Bros. & Co., Lynn, Mass. (the Improved Lightning Bottle Washer).⁶ The advertisement of the latter that "Our washers have been adopted by all the largest bottlers in the country," was supplemented by a list of more than 200 bottlers using them. It sold for \$75.00 and was no doubt a popular item of bottling plant equipment at that time.

POWER OPERATED WASHERS

In the early years of the 1890's, however, new types of power-operated brush washers began to appear. One of these was "Hamann's Bottle Washer," made by Charles W. Hamann, of Brooklyn, New York. It was of a horizontal rotary type, holding 18 bottles on 18 rinser jets, and with a revolving brush with which the bottles were

brought into contact for outside cleansing. Its job was to "clean, rinse, and drain."

Another was the "Eick Bottle Cleansing Machine," made by the Eick Bottle Cleansing Machine Co., of Philadelphia. It also provided the internal rinse, and internal cleansing with revolving rubber brushes to 12 or 16 bottles placed in it manually in each operation.⁷ Then there was the "Gillett Shotting Machine," made by the Bailey Engine Co. of Lima, N. Y.

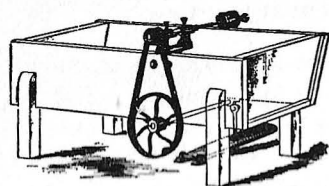
And there were a host of others, sold by such firms as the Bottlers' and Brewers' Machine Manufacturing Co. (New York City), Buchheit & Hasemann (St. Louis), Lutter & Gies (Milwaukee), George S. Slocum (Newport), S. Twitchell & Bro. (Philadelphia), Valley Iron Works (Williamsport), Weisel & Vilter Manufacturing Co. (Milwaukee), and Wittermann Brothers (New York City).

It will be understood, of course, that the brush types of bottle washers previously referred to were separate and apart from the soaking tank. Soaking the bottles was the first stop; then the brush washing; then the final rinsing. Yet despite the obvious improvement in the bottle washing operation coming from the new mechanical devices, the simpler hand operation of the "Improved Lightning" washer, and "shotting," persisted in the smaller bottling plants for many years, including several years of the new century.

In larger bottling plants, such as in the breweries, by the turn of the century bottle-soakers of considerable size were in use. Some of these were the predecessors of the soft drink bottler's equipment of the early 1900's, with the bottles being carried through the soaking tank in pockets of the endless chain type. Bottles were loaded and unloaded by hand.

Another type used by the larger brewers was the "Nordberg Wheel," built by the Nordberg Manufacturing Company of Milwaukee. Similar in principle to the "Triumph" and "Wilson's Patent" machine previously mentioned, this was essentially a drum type of pocket soaker, hand fed on one side, slowly revolved to soak the pocketed bottles in the tank underneath, and unloaded at the opposite side for the brushing and rinsing operation.

The Schlitz Brewery of Milwaukee, in 1893 had thirteen of the Nordberg Wheels in operation, but their installation in soda water plants of the period is not a matter of history. And yet, from subsequent developments in bottle washing equipment, it seems clear that all of these early innovations contributed to the progress just ahead.



Enterprise Bottle Washing Machine

13

Flavorings and Flavors

SOME OF THE BACKGROUND

Man's use of refreshing drinks made of water and flavor, with or without sweetening, goes back many centuries, and it makes an interesting story. For such a discourse, in all its historical aspects, one should consult *Beverages, Past and Present*, by Edward R. Emerson (2 volumes, New York, 1908), or other books of that nature.

Attention here is given to the early developments in flavorings used for soda water, or carbonated beverages, in the American industry. And yet, for a reasonably complete understanding of that subject, attention must be given to some phases of the background.

It is a matter of interest, for example, to note that the transition of soda water from a simulation of effervescent natural mineral waters, used for their medicinal values, to an item of pleasurable refreshment having some of those same values, was not the only reason for their early popularity. Flavorings were added early as an addition to their pleasing qualities, and in great variety. It was no doubt the variety and extent to which flavorings were used early in the American soda waters which distinguished them from their European counterparts, and which tended to characterize the flavored carbonated beverage as American in origin. It is the variety of such flavorings, therefore, rather than the details of their manufacture which is of interest here.

THE "SMALL" BEERS

The early periods of American history are especially notable for the importance attached to the distilling of spirits, and the consumption of liquor was so prevalent as to make it almost the common beverage. Naturally, that was not without serious effort on the part of those who opposed the practice to encourage substitution of the more innocuous liquids, and to promote temperance.

In addition to the making of spirits, therefore, the early American colonists developed their own alternates for the intoxicants. One of these was "switchel." This was a concoction of molasses, vinegar, and ginger in water. In another type the vinegar was left out. Other drinks were various infusions of the leaves of shrubs and plants, such as of the raspberry, ribwort, sage, strawberry, and currant. These were used as a sort of tea, for flavor and to disguise the unpleasant taste of the available waters. Nettle beer was another, made with molasses, and others were hop drinks.

Spruce beer, too, became one of the favorites among the American substitutes for spirits. During the siege of Boston, General Washington prescribed as part of the daily ration of the Revolutionary troops "a quart of spruce beer, with now and then a glass of grog." In this same general category were root beer, sarsaparilla, and birch beer, made from an infusion of barks, sugar, water, and yeast. Fermented ginger beer was popular in the early years of the 1800's; it was made from sugar, citrus juices, honey, ginger, and water.

Mead was another beverage widely used in America. It, also, was a fermented product, the principal ingredients of which were honey and yeast. Sometimes oil of nutmeg, oil of lemon, and oil of wintergreen were added for flavoring purposes, with sugar. Neutral spirits or whiskey checked fermentation.

Mead provides a good example of the changing times during the period prior to 1830. In 1819, for instance, a United States patent was issued to James Heaton, of New York City, for a carbonated mead, quite obviously a new product of the soda water maker, or of the apothecary shop. Another patent for a carbonated sarsaparilla mead was issued in 1824 to John L. Schieffelin of New York City. Mead must have been still popular in 1833, when another patent on it was issued to Jonas C. Brigham, of Methuen, Mass.

Mead was one of the items produced by the bottling plant of George S. Twitchell, in Philadelphia, about 1850, along with spruce beer, and tonic root beer, in stone bottles. Spruce beer was the first product of William Hutchinson, when he opened his bottling plant in Chicago, in 1848.

Alcoholic content of the "small" beers was about 2% when made; aged before use their alcoholic content was likely to increase to 3% or 4%.

In the fruit flavored soda waters, lemon was the favored item.

FLAVORING PROBLEMS^{1,2}

That citrus flavorings were better adapted to the flavoring of the bottled soda waters during the earlier years of the 1800's seems apparent. Lemon, especially, had early usage and predominated in the bottled drink field until ginger ale was introduced. The problems of fermentation and spoilage in a product held for any length of time, as well as the immature state of the art, no doubt account for the general absence of other fruit flavors in the bottling trade of those years.

This limitation regarding flavorings must be kept in mind, as it undoubtedly put the soda fountain and the bottling of soda water in different categories, for the same restriction did not apply to the fountain drinks. There the juices of many fruits could be prepared as needed for the drinks to be served that day, or kept on ice in syrup form without too much danger of fermentation. As to the bottled drinks, other factors also seem to have had greater application in making them acceptable to the consumer, including the aroma, or bouquet, and the proper taste balance of flavor and carbonation.

Temperature and color of the bottled drinks, too, were considered to be related to their flavoring problems, and to add to those difficulties of the bottler.

The existence of these flavoring problems appears as a likely explanation of the bottler's reliance upon the small beers for a large portion of his output during the first years of the last century.

FLAVORS AT THE SODA FOUNTAIN

The difficult flavor problem faced by the bottler of those times is suggested by the references in the literature of that period to the making of the flavoring syrups. Even as to those prepared for the soda fountains, during the earlier years their variety was quite limited, the smaller establishments using four or five—lemon, vanilla, raspberry, strawberry, and ginger. Larger establishments having a dozen or so flavors were the unusual.

Early making of flavors largely involved the soaking of natural roots and herbs in alcohol, which drew out the natural oils, in manner similar to the making of drip coffee. Another method was the boiling or distillation of water-soaked herbs, which is similar to making percolated coffee. While these methods did not capture the light fragrances of the products being worked, as do the vastly improved methods of the twentieth century, they did produce recognizable flavors.

Fruit flavors were handled somewhat differently because of the jelly-like substance formed when alcohol was used and the constant sediment upon standing, similar to that of wine. If the fresh fruits were mashed and mixed with sugar syrups, they were only usable for that day. And in the use of citrus peel oils for flavor, the danger of rancidity was always a problem.

By mid-century, however, the art of making a greater variety of flavors had improved much. The number and kinds shown in the 1853 recipes of Lacour, mentioned previously, indicate this. But the nature of them, primarily fruit flavored syrups, clearly indicates they were for prompt usage, such as at the soda fountain, rather than in the bottled products.

In 1865 the Philadelphia firm of Powers and Weightman, makers of drug and chemical products, were advertising flavorings for the soda water trade, including Pineapple, Blackberry, Orange, Apple, Strawberry, Raspberry, Gooseberry, Pear, Melon, Lemon, Cherry, Plum, Grape, Apricot, and Peach.

An early publication, the *Modern Confectioner*, by William Jeannes (1861) included soda fountain recipes for making fresh fruit syrups from Raspberry, Currant, Cherry, Mulberry, Strawberry, Barberry, Lemon, Orange, Ginger, Pineapple, and Violet Flowers. He also makes reference to the addition of fruit essences to the syrups.

Parrish's *Treatise on Pharmacy* (4th Ed., Philadelphia, 1874) includes formulas for making syrups for mineral water; the flavors Orange, Ginger, Sarsaparilla, Raspberry, Cherry, Pineapple, Vanilla, Coffee, and Orgeat. This latter, and some of those previously men-

tioned by Lacour, were flavors used by the pharmacist in medicinal preparations, such as cough syrups, which is indicative of that influence on his fountain business.

For comparison of the flavor preferences of a few years later, instructions issued by Tufts of Boston about 1890 are of interest. For soda fountain operators, the list of flavors is increased considerably. In syrup form for flavoring soda water, are listed: Almond, Asphodel, Banana, Blackberry, Birch Beer, Blood Orange, Calisaya, Catawba, Celery, Phosphate, Checkerberry, Cherry, Chocolate, Coffee, Crabapple, Cranberry Phosphate, Cream (vanilla), and Currant. Then, in addition are listed Ginger Ale, Dublin Ginger Ale, Belfast Ginger Ale, and Hub Ginger Ale. The list continues with Grape, Kola Champagne, Lactart, Lemon, Lemon and Lime, Limeade, Maple, Nectar and Cream, Orange, Orgeat, Peach, Pear, Pepsin Soda, Root Beer, Pineapple, Pistachio, Plum, Raspberry, Rose, Sarsaparilla, Strawberry, Vanilla, Syrup of Violets, Walnut Cream, Wild Cherry, Wintergreen, and numerous others—but that's not all.

As distinguished from the generic list of soda water flavors just given, Tufts also lists an interesting series of specialties recommended to the fountain trade, being combinations of flavors, such as: Ambrosia—raspberry, vanilla, and hock wine; Amycose—raspberry and orange; Clarique—claret and lemon; Goldenade—lemon and egg; Jacqueminot—rose syrup and egg; Juliet—ginger, pineapple, and grape; Moorish Sherbet—strawberry, pineapple, vanilla, and milk; Nectar—strawberry, orgeat, and wine; Persian Sherbet—strawberry, lemon, and orange; Queen's Favorite—pineapple, raspberry, and vanilla; Siberian Flip—orange, pineapple, angostura bitters; Spa Fizz—lemon, strawberry, and orange; and a "Don't Care" soda (mixture of pineapple, strawberry, vanilla, port wine, and syrup).

As a sidelight on the foregoing, for the colder months "Hot Soda Water" was offered to the trade, but again the term was being misused, for the mixture was only hot water and flavoring; no carbonation.

FLAVORS FOR BOTTLING

From the instructions given in the early literature for the making of flavoring by the soda fountain operator, or by the bottler, it is apparent that in the first stages of development of flavored drinks the juices of crushed fruits were depended upon as a primary source of flavoring for the syrups used.

Later, as the trade increased, and the commercial manufacture of flavoring materials became more prevalent, the flavor continued to be designated by the name of the fruit from which made, or which it simulated, but frequently without designation as to its genuine or its synthetic character. Citrus flavors, of course, were usually from the fruit acids and fruit oils. But with rapid developments in flavoring manufacture at that time, and absence of the regulatory features of food control legislation, later enacted, it may be readily assumed that many of such fruit-named extracts offered the fountain operators and the bottler, depended upon synthetics for their flavoring effectiveness.

In the 1876 catalogue of the Firm of John Matthews, of New York City, for example, the trade was offered a wide selection of "flavoring extract"—including lemon, sarsaparilla, strawberry, raspberry, pineapple, pear, peach, nectar, banana, cognac, orange, Jamaica ginger, orgeat, blackberry, coffee, rose, peppermint, bitter almond, Persian mead, cream soda, and spruce beer. A number of these, among the fruit flavors, were no doubt artificial in whole or in part.

The difficulties, which were virtually insuperable in that day and age, of bottling a soda water with true fruit flavorings which would keep fresh and unfermented until it reached the consumer, are pointed out in Sulz's *Treatise on Beverages; The Complete Practical Bottler*, of 1888. Even as to the citrus oils used for flavoring, oxidation of the terpenes frequently resulted in rancidity, while elimination of the terpenes by heating methods then in use damaged the flavoring's bouquet. Foote and Jenks, new in the flavoring field in 1884, were successful in producing the first terpeneless, soluble citrus flavors not subject to the rancidity of the older process, and this added to the popularity of the bottler's citrus drinks, as well as to their practicality for bottling.

In offering their flavoring extracts to the bottler, the Matthews firm stressed particularly such flavors as lemon, sarsaparilla, champagne cider, Persian mead, root beer, cream soda, and ginger ale. These represented the major items in which the bottler found quality could be maintained, and which were most acceptable to the consumer. The smaller bottling plants usually limited their flavors to the few included in a common trade classification which, during the closing decades of the 1800's, came to be known as the "red, white, black, and brown" line of sodas. This had particular reference to strawberry, lemon, sarsaparilla, and cream soda (vanilla). And then, of course, there was ginger ale.

GINGER ALE³

History generally gives much of the credit for origin of ginger ale to Dr. Cantrell, of Belfast, Ireland, as mentioned in a previous Chapter. His activity centered about 1850-1852, with the Belfast-Dublin firm of Cantrell & Cochrane, the story being that ginger ale was developed as a substitute for the brewed ginger beer, for shipment to the British troops in India, as it had better keeping properties. It was pleasingly clear; ginger beer was usually cloudy. And it was easier to manufacture. It soon became a major item of export from Ireland to the United States.

Sulz also gives credit for the development and improvement of ginger extracts for flavoring ginger ale to B. S. Proctor (1859), J. L. A. Creuse (1873), and Carl Riebe (1864).

As a popular item in bottles, ginger ale was no doubt the major product of most bottlers of carbonated drinks during the closing years of the 1800's. Among those drinks the Irish ginger ales, actually imported or of that type and known as Belfast and Dublin ginger ales, were specialties.

In addition to ginger ale, the plain soda water, or club soda, also had its vogue, as a mixer.

VIBGYOR—THE RAINBOW

Coloring, too, was something of a problem, although that was simplified to large degree by the acceptability and wide use of caramel in many drinks. Derived from burnt sugar, caramel was used in the "brown" and "black" sodas. Early red colorings for drinks such as strawberry were derived from cochineal, or carmine, or cudbear. Vegetable colorings soon made their appearance, but they were unstable and largely unsatisfactory. The aniline colorings came into general use about 1880-1890, but the making of the synthetic colorings, while they were no doubt harmless, was not subject to the regulation later prescribed under the Federal Food and Drug Act of 1906. And their use in soda water and other foods frequently was caustically commented on by the everpresent critic of the factory-prepared foods of that age.⁴

In the later years of the century steady advances in food chemistry were being made, beginning with the work of Tiemann and Wallach in 1872 from which they obtained synthetic vanillin, the active flavoring principle of the vanilla bean. Cost was a vital factor in providing the incentive in that field. Vanilla beans sufficient to yield one pound of vanillin cost about three hundred dollars; the artificial flavoring could be marketed for less than ten dollars.⁵

Prior to 1870 a high degree of flavoring chemistry did not exist. Some artificial fruit flavors were made, but they were very incomplete and unsuited to their purpose by later standards. Subsequently, however, progress was made in the synthesizing of the fruit flavors not otherwise practicable for the bottled drinks, so that this gave encouragement to a somewhat wider use of the artificial flavorings during the closing years of the century. But it was the red, white, black, and brown line which predominated well into the 1900's.

THE 1880-1900 PERIOD

The industry was in its growing stage, too, and making rapid progress. Prior to 1850 the number of bottling plants was less than 100. By 1880 they had increased to slightly over 500. But in the next ten years, or by 1890, around nine hundred new plants had been added, and the total neared 1400. And during the succeeding ten years the doubling process was repeated, with a total of almost 2800 plants at the turn of the century.

The growth in value and volume of products, too, corresponded with the increase in plants. With annual products valued at only three-quarters of a million dollars in mid-century, by 1880 that value had increased to almost five-million for each year. But in the decade 1880-1890 annual production value increased tremendously, until in the latter year it neared fifteen million dollars. And by the beginning of the new century it had again almost doubled. Value of annual production for the year 1900 was about twenty-five million dollars.



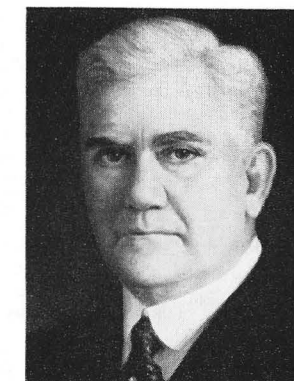
Jacob Baur
1856-1912



William Painter
1838-1906



Charles G. Hutchinson
1847-1906



Michael J. Owens
1859-1923



George J. Meyer
1871-1945



Charles E. McManus
1881-1946

SOME CONTRIBUTORS TO THE INDUSTRY'S TECHNICAL PROGRESS



FOUNDERS OF NATIONAL MANUFACTURERS OF SODA WATER FLAVORS—1905

Top: Edwin Forrest (Eastern Extract Co.), S. LaBue (Standard Bottling & Extract Co.), J. W. Humphreys (Blue Seal Supply Co.). Middle: Samuel Mutch (Whittle & Mutch), W. A. Washburn (Clicquot Club Co.), Robt. L. Woods (American Extract & Supply Co.), C. B. Hall (Lennox Chemical Co.), E. P. Wakefield (Murray Co.), G. A. Stickles (Eastern Extract Co.), H. C. Schrank (Schrack Co.). Front: D. W. Hutchinson (W. H. Hutchinson & Son), O. A. Atkins (Standard Bottling & Extract Co.), C. O. Sethness (Sethness Co.), Thos. E. Lannon (Ass'n Counsel), Selden Twitchell (S. Twitchell Co.), Edward Post (Armstrong Cork Co.).

The consuming public was buying bottled soda water. The new plants being opened meant more capital investment, more equipment, and more business in the community. The additional products sold meant more employment. But it also meant that more raw materials were used, and flavorings were the most important in that category, for the success of the product depended in large degree upon the popularity of its flavor.

EARLY FLAVORING SUPPLIERS

The search for the flavor which would please the consumer's palate was therefore a constant one, and that goal of the bottler was aided by a constantly growing number of flavor manufacturers in the field, with Boston and New York the centers of their activity.

Early in the nineties in addition to suppliers of equipment like the firms of Matthews, Puffer, and Tufts, who also furnished their clientele with flavoring materials, there were more than a score who specialized in the flavoring extracts the bottler used.

In Boston these included such firms as Beach & Clarridge, Dr. H. L. Bowker & Co., Standard Bottling & Extract Co., and others.

New York firms listed American Extract & Supply Co., DeLisser & Co., LaGrassa & Rosenfeld, Maas & Waldstein, J. H. Mergentime & Co., and Wood & Selick.

McKesson & Robbins as early as 1881 were advertising concentrated essences for soda water syrups.

Then there were S. Twitchell & Bro., and Whittle & Mutch, both of Philadelphia; E. Berghausen Chemical Co. of Cincinnati; J. Hungerford Smith Co., of Rochester; and W. H. Hutchinson & Son of Chicago. The Acme Extract & Chemical Works was located at Hanover, Pa.; Ladwig, Schrank & Co., and A. Schlueter & Co. in Milwaukee; the West India Manufacturing Co. in St. Louis; and Foote & Jenks, at Jackson, Michigan. It was a little later, about the turn of the century, that the Liquid Carbonic Acid Manufacturing Co. entered the flavoring business and advertised "Baur's High Grade Extracts."

THE PROPRIETARIES GET STARTED

It was in that period of rapid expansion during the 1880-1900 years that several of the prominent franchised drinks of later years got their start in the business.⁶

Charles E. Hires exhibited his package of dried roots and herbs, for making "Hires" root beer, at the Centennial Exposition in Philadelphia in 1876, and sampled the finished drink. Household extracts and fountain concentrates for the same purpose followed in the early 1880's. As early as 1884 the national advertising of his extract, for home use, appeared in Harper's Weekly, and in 1885 in Harper's Magazine. By 1892 almost three million bottles of it were being sold each year. Bottling of the finished product for distribution to retailers started about 1893.

In Atlanta, just a few years later (1886) Coca-Cola was making its debut at soda fountains. Dr. John S. Pemberton, originator of Coca-Cola, sold 25 gallons of syrup the first year and spent \$46, or about 90 percent of his receipts, for advertising, mainly for oilcloth signs which were pinned to drugstore awnings. The second year he sold more than a thousand gallons, and included Atlanta's horsecars in his advertising media for that year. The bottling of Coca-Cola started in the early 1890's.

Meanwhile, in 1881, Henry Millis, in the Massachusetts town named after his father, began bottling sparkling cider, and later ginger ale and other drinks. To them he gave a name with a French twist—Clicquot Club. Then, by 1885, the Moxie Nerve Food Company of Boston had developed its novel bottled drink named "Moxie." Both products were aggressively merchandised in the New England area during the closing years of the century.

And it was the root beer of Hires, and the ginger ale and other products of the Clicquot Club line which were advertised in the bottlers' trade press during the late 1890's, for bottling and sale under those proprietary brands by an early form of franchise.

There were many others who gained prominence, of course, yet only a few retained it for any long period of time. But there were a few others who also began their business life during those pre-1900 decades, and later became of national importance in the trade as manufacturers of the flavorings for their proprietary drinks, and in the franchising of other bottlers for their bottling and distribution.

The start of Vernor's ginger ale, in Detroit, and Dr. Pepper, in Waco, Texas, both in the 1880's, are examples. Pepsi-Cola was in its early stages of manufacture, in New Bern, North Carolina, around 1896. White Rock, of Waukesha, Wisconsin with its bottled mineral water, was early in the field, starting about 1883. Expansion of its line to ginger ale and other beverages came later.

It took some time, however, for the foregoing to gain the prominent position held in the trade in the later years of the 1900's. At the turn of the century the industry was still young, and its plants small, with practically all of them producing their own brands and flavors of drinks best suited to meet the whims of consumers in the area. The dominance of national brands and types, bottled and sold under franchise, was a Twentieth Century development, long in coming.



Early Proprietary Bottles

14

People, Places, and "Pop"

1800 - 1900

EARLY NEW YORKERS

The humble beginnings of the bottled carbonated beverage industry in America become quite apparent when the historian searches for specific references to people and places active in the trade during its formative years. Even in the metropolitan areas, where early bottlers of the artificial mineral waters were located, the absence of such records tends to show the uncommon nature of the product and its lack of any real public demand. And that can account for there being so few engaged in its production.

Yet it was promptly after the initial commercial ventures of Hawkins in Philadelphia, and Silliman in New Haven, that the pump-room made its appearance in that other fast-growing center of American life—New York City. This was by 1809, and at a time when the city's population was just reaching the 100,000 mark. The artificially carbonated waters were offered for export, also, and they were being bottled for that purpose. Pump-rooms at the Tontine Coffee House and at the City Hotel were most prominent among the spas. Their suppliers were close by. George Usher, "mineral water manufacturer," was located at 587 Broadway. Noyes Darling had his laboratory and chemist shop in the City Hotel.¹

In the years which followed there were, of course, some changes. The city continued to grow, and by 1830 there were 207,000 people on Manhattan, with another 15,000 in Brooklyn. The dread plague which visited the city during that same general period was attributed by many to impurity of the drinking water. Perhaps that caused some attention to be given to the processed waters, just as it was reason for the start of the Croton aqueduct in 1835. In any event, by that time the trade was more active. In 1832-3 the Usher business was being conducted at 251 Broadway and at 12 Wall Street, by Luke Usher. Joseph Boston, whose early inventions in the field have been noted, was making his soda water at 252 Broadway, where his chemist shop was located, and at 7 Wall Street. Competition apparently meant being located near one another.

And then it was in 1832 that John Matthews actively entered the trade, with the ultimate transfer to him of the Usher and Boston businesses by their widows. Matthews very probably took them over in the later years of the 1830's; Joseph Boston was active in 1836. John

Tweddle, A. W. Rapp, and Thomas Newton were among the first of the city's bottlers of the new flavored soda water, so tradition tells us; this was in 1843.

New York City passed the mid-century mark with half a million potential consumers; by 1860 they numbered 800,000, and as the year 1870 neared the million population mark was passed. With such growth the city continued as the leader in activity in that item of simple refreshment—soda water. By then its popularity was an accomplished fact, with the soda fountains in the drug stores being centers of attention, for they were then giving new attraction to the customers by the addition of marble fountains and other startling innovations in serving a wide selection of the effervescent concoctions.

In 1868, for example, the stores of Hudnut (Herald Building), Scripture (Liberty Street), and Delatour (Wall Street), as well as the apothecary shops of Dr. Hanbury Smith, Rushton, and Caswell & Mack, were noted for the fountain sodas they served.

Hudnut's fountain, one of the more popular, was reputed to serve 3,500 glasses or more of soda water on the hotter days. In others 1,500 glasses a day were not unusual. Smaller stores, of which there were about 700, had an average daily output of 200 glasses, or more, in hot weather, according to an account of the time. Many of these depended upon the local soda water plants to provide their fountain tanks of carbonated water.

THE BOTTLERS²

Schulz & Walker is frequently mentioned as one of these suppliers; also Bolen & Byrne. The latter also conducted a "Spa" at 169 Broadway, and in the later years of the 1870's featured "Excise Tonic" in bottles. But they were only two of the 45 soda water bottling plants in operation in New York City in 1868; in 1860 there had been but 14. Lanman & Kemp, during the fifties had specialized in bottled sarsaparilla, while C. H. Phelps, at White Plains, had adopted the well known "Delatour's" name as his brand for bottled drinks. Whether they were still in business in the later year is not apparent.

In the sixties the popular flavors were lemon soda and sarsaparilla, with the bottled drinks being used mainly at the bars and at the country places where there were no fountains. Some of the larger firms produced and sold as much as 3,000 dozen bottles a day; the smaller plants averaged around 200 dozen, so we are told by an 1868 report.

Then a little later, as the 1870 decade began, new names appeared on the New York City scene. Among these were Ryberg Brothers, and Solomon L. Simpson, the latter doing a bottled ginger ale business. Cantrell & Cochrane, importers of the famous ginger ale they bottled in Ireland, entered the American market in this same period (1866-1868). And in Newark, N. J., the firm of Brandt Brothers were bottling their "B.B." line in 1867.

The early activity of the bottled soda water trade in New York City has been mentioned as perhaps the best example of those years prior

to 1875. But the popularity of the refreshment, and its manufacture, grew with the country's increasing population; in 1830 it was 13 million, and by 1870 the tide of immigration had well started, increasing the potential consumers to about 40 million. And, of course, those years included the very critical period of the Civil War which, despite its tragic features, in the northern States had the effect of keeping employment and business at high levels, and provided early impetus for business growth during the succeeding decades.

OTHER EAST COAST CITIES

Cities of New England and other portions of the east coast were growing rapidly. This was particularly true of Boston, where but 5 soda water bottlers were operating in 1860. But in the years following the War the soda water trade in the Hub City showed rapid expansion, with many new names, new drinks, and new brands to serve a population which soon reached a quarter of a million.

Early in the seventies, for example, Dr. H. L. Bowker introduced his "Bowker's" birch beer to Bostonians; both he and his products later became well known to the industry. Vincent, Hathaway & Co. featured their "Boston" ginger ale, while the Berlin Mineral Water Company also distributed their bottled mineral water, and a line of bottled "tonics."

In nearby New Hampshire, at Laconia, J. R. Champlin opened his small bottling plant, in 1874. At Hartford, Connecticut, the firm of Anderson Carson and William Lemon, started bottling their brand "Lemon's Superior Sparkling Ginger Ale" in 1870. They registered their brand in the Patent Office in Washington, on February 14, 1871. It was Registration No. 159 under the newly enacted Federal trade mark registration statute, and was the first to be so registered for any kind of soft drinks.

In Philadelphia, by mid-century the early bottled mineral waters of Hawkins and Durand, and the flavored lemon soda of Roussel were long since gone. The bottling business of George S. Twitchell already was old in the field, which he had entered in 1844, buying the business of Charles Whittemore, brewer of spruce and root beers. And it had grown to substantial size, with a line of mead, spruce beer, and tonic root beer, put up in stone bottles. About 1868 Twitchell sold his bottling business to his employees, and they continued it for a time, while his son Selden Twitchell entered a new venture—the bottlers' supply field.

In this period, also, another Philadelphia bottler of soda waters was E. E. Postens & Company, while in Baltimore the A. S. Miles & Company were advertising their "Porter's Celebrated Belfast Ginger Ale."

Philadelphia had 9 soda water plants in 1860; Pittsburgh 2, Cincinnati 5, and Cleveland 2.

Washington, during the War period (1861-1865) was a center of activity and constantly crowded far beyond its permanent population

of 75,000, and included many thousands of Union soldiers on their way to or from the fronts, or undergoing treatment in the city's hospitals. In 1864 the city listed four bottling plants in the business of providing sarsaparilla and other soda waters, and mineral waters. Beer also was bottled. Within a few blocks of the Capitol building, three of these bottling operations were carried on by William N. Maack, James H. Magee, and the firm of Ross & Otto. However, the more prominent of all was the Union Bottling Depot, located in Georgetown and operated by Riley A. Shinn, successor to Arny & Shinn.

IN THE MID-WEST

With the mid-century point the bottling of carbonated waters and flavored soda water already had gone through its initial stages in the younger cities to the west.

William Hutchinson (1812-1878) began his bottling business in Chicago in 1848, first producing spruce small beer, then soda water. Following the Civil War the firm became W. H. Hutchinson & Company, to include his two elder sons, William A. and George C. It was another son, Charles G., who in 1878 invented the Hutchinson bottle stopper. The firm subsequently became known as W. H. Hutchinson & Son.

In addition to the stopper, the company added a line of bottlers' supplies, including flavors and proprietary drinks. Among the latter were "Orcherade" and "Wina Vina," which were still popular at the turn of the century. A fourth son, Douglas W., early in the 1900's became manager of the business, later one of the industry's major suppliers of crowns and other items used by the soft drink bottlers.

Meanwhile, John A. Lomax also had pioneered in the bottling trade, in Chicago, starting in 1851, and Burkhardt's was early in the field, while in Galena, Illinois, C. E. Kleis went into business as the Galena Bottling Works, in 1857. In 1860 he moved to Dubuque, Iowa, and established the C. E. Kleis Company.

Peter Schille opened his soda water plant in Columbus, Ohio, in 1865. A. Wegener started his business in Detroit, in 1870—one which was to be identified with that community for more than eighty years. And in 1871 E. J. Williamson, in St. Louis, was bottling his product under the fanciful name of "Melaroma." Otto Zweitusch had been in the soda water trade in Milwaukee since 1858, and branching out into the manufacture of apparatus for other bottlers.

In the little town of Shakopee, Minnesota, Jacob Ries opened his bottling shop, in 1872. It was about this same time that Cilo Chesterman took over a small bottling works in Dyersville, Iowa, for the making of soda water. Later, in 1882, the firm became Chesterman & Barrow, operators of the Hawkeye Steam Bottling Works, and moved to LeMars.

SOME MID-CENTURY STATISTICS

The scattered nature of the industry during its period of organization prior to 1875, just discussed, is well illustrated by the Census

records, although it is most unfortunate that they do not give the names of those engaged.

As the year 1850 opened the number of bottlers of "mineral water and pop," totaled but 64 for the entire United States. Invested capital for each business averaged less than \$4,000, annual sales \$12,000, and number of employees 9. This means, of course, that the annual production for the entire industry was but \$760,000, according to the 1849 Census.

Ten years later there were almost twice as many in the business—123 bottling plants, with a total investment in the industry of \$586,000. And with 727 employees, the value of the annual production had increased to \$1,415,000.

Then, during the "sixties," the number increased rapidly. By 1870 there were 387 soda water bottling shops in operation, with total investment estimated at \$3,462,000. The increase in average investment required to about \$10,000 is some indication of the higher costs of the newer machinery being made available, and of the substantial business many were doing. During 1869 the industry had a total gross business of \$4,222,000, according to the Census report for that year.

THE FOURTH QUARTER

The rate of growth during the last quarter, shown by the statistics, was even more impressive, for during that period the number of bottling plants had increased to almost seven times the starting level. As the year 1900 opened 2,763 factories were operating in season, for it was still largely a summer business. Capital invested was almost \$20,000,000, with 8,800 employees, and annual production valued at approximately \$23,250,000.

More important than mere numbers or dollars, however, is the fact that it was during this last quarter of the 1800's new people were being attracted to the field. It was during those years that many of those started whose later successes in the bottled soft drink business of the twentieth century are recognized as important contributions to the American economy. Others were successful, also, and then disappeared from the scene, but they made their contributions, too, as a heritage for those who were to follow. In retrospect, the activities of some in both categories are of interest.

NEW ENGLAND

The cities of New England shared well in this rapid growth of the new American industry. Boston, particularly, had assumed a position of major rivalry with New York City in the manufacture of apparatus for the soda water bottler, with its Dows, Tufts, Puffer, and others. And the number of its bottling shops had increased at a fast rate. With 5 plants in 1860, by 1900 Boston had 23 in operation, to serve a population of 561,000, if they could be sold.

It was during these later years of the century that Henry L. Millis, of Millis, Mass., just outside Boston, first put his "Clicquot Club" line

on the market (1889). After some difficult years following the panic of 1893-94, during which the business was variously owned, the controlling interest was acquired by Horace A. Kimball, of Providence, Rhode Island.

During that same period (1885) the well known "Moxie" was originated and bottled by the Moxie Nerve Food Company, in the Boston area.

Others among Boston's bottling plants getting started in those years were such firms as Fairbanks-Snyder Company, and Clark and Roberts. Then there were individuals, too, with their own shops, including Otis T. Neale, Jacob Worth, and George W. Brigham, all of whom became prominently identified with the trade. S. T. Driscoll & Co. were active too, bottling "Grape Nectar" and another item they called "Boston Bitter Brown Beer." And a ginger ale named "Cold Blast" was being produced by bottler F. L. Hazelton.

In 1890 there were 5 bottling plants in each of the cities of Lynn, Springfield, Worcester, and Lowell. Numbered among these were M. C. Heald & Co. of Lynn, and George F. Hewett & Co. of Worcester; and with which the well-known firm of Curran & Joyce, of Lawrence should be included, for they entered the field at about the same time.

The bottling of "Tonic," as soda water became more commonly called in northern New England, spread rapidly to outlying cities, and in the nearby States, especially near the beaches and other resort areas. Home deliveries by the beer and soda wagon predominated in the cities. Many of the bottlers bottled beer also; for them tonic usually was a side line.

In the later years of the century, the products of C. H. Eddy & Co. of Brattleboro, Vermont, and Ingalls Brothers, of Portland, Maine, were widely known in the trade. And the firm of Hiram Ricker & Son, of South Portland, got its start with the famous Poland Spring water, and its carbonated products, while the Pine Spring Water Company, at Brunswick, sold its own brand of bottled ginger ale.

A Connecticut list of the better known firms of those years would include F. D. Morehouse & Co. of Bridgeport, and Daniel Gilhuly & Co. of New Haven.

In Rhode Island the Rumford Chemical Company had extended its operations into soda water and was producing bottled "Phosa." T. H. McCusker, another Providence bottler, named his product "Herbo." Both were spirited competitors with products such as "Moxie" in its efforts to extend its operations into the Rhode Island market.

By 1900 there were 129 soda water bottlers in Massachusetts, 31 in Rhode Island, 74 in Connecticut, and a total of 53 for Maine, New Hampshire and Vermont.

NEW YORK CITY AND ENVIRONS

The expansion of the bottled soda water trade in the New York City area during the last quarter of the 1800's illustrates the natural

effect of an increase in population and in popularity of a product. In 1880 the population of the metropolis, including Brooklyn, was less than 2 million; in 1890 it was 2.5 million, and in 1900 there were over 3.4 million people. Bottling shops in the metropolitan area increased from 53 in 1880, to 153 in 1890, and to 356 in 1900.

During that time, in addition to some of those previously mentioned who were already in the trade, there were newcomers who, by their interest and their activity, left their mark for history to record. H. Downes was one of these, as the producer of bottled "Imperial Inca Coca"; as well as S. A. Luden, whose product was "Carbonic Selters Vichy"; and John Morgan, with his "John Morgan" ginger ale.

Others in the Manhattan area included such names as the New York Bottling Company, A. Liebler Bottling Co., Phoenix Bottling Co., and F. Hollender Company. Hiscox & Company were bottling a ginger tonic; M. Michaelis & Son their cream ginger ale; Koster & Bial a line of carbonated beverages, and beer. The "Golden Key" mint sodas was a product of the Union Bottling Company.

On the Brooklyn list were the firm of Eben Seely, T. L. Neff's Sons, Inc., Smith & Layton Co., the Creedmore Bottling Company, and Minck Brothers & Co. H. S. Litchfield & Co. had started in 1877, with their "Centennial" root beer, while another Brooklyn bottler, R. Robinson, made what he named "Queer" soda water, and a temperance beer. Hatfield & Bell, later to become prominent in industry affairs through the activity of William B. Hatfield, started in 1887 at nearby Bay Ridge.

Across the Hudson, in nearby New Jersey, during the early 1890's the firm of Lighte & Company was producing the line of "Lighthouse" bottled soda, and had several competitors, including L. Steinberger Co. and Joseph A. Cronkright. H. L. Schmidt Mineral Water Co. was doing business in Hoboken; and A. Seilheimer in Hackensack. Newark, a little further away, included among its soda water bottlers C. Feigenspan, Ransley & Company, and the Otto Brandt Beverage Company.

Upper New York State also had its soda water bottlers, although in 1890 there were less than 50 in the State outside the New York City area. Among the better known newcomers to the trade in that general period were Rogers & Pearson, of Buffalo, with their "Hudor" line of mineral water and soda water, while in Syracuse the bottling firm of L. House & Sons was promoting their drink "Cherriett." Four other House brothers, Charles, Jacob, Henry, and William, also were operating bottling plants in Little Falls, Batavia, Rochester, and Lyons. Saratoga Vichy Springs Company was active, of course, with bottled waters from the springs. F. J. Smith, at Albany, bottled what he called "Old Fashioned Root Beer," and the Eagle Bottling Company of Elmore had a complete line of carbonated beverages.

PHILADELPHIA AND PITTSBURGH

It was early in the 1875-1900 period that the "Egg Soda," in its egg-shaped bottle was introduced to Philadelphians by bottler Samuel F.

Simes. Charles E. Hires had established his root beer extract business about 1876, and by 1893 was bottling the finished "Hires" root beer at the Philadelphia plant of his Crystal Bottling Company, 117 Arch Street. For competition he had Bean & Brother who entered the Philadelphia market with "Bean's Great American Root Beer" about 1880; the "O.K." root beer of C. L. Heinle Co. was another.

Many others followed in the Quaker City, including the "Dove Brand" of bottled drinks of the Pennsylvania Bottling & Supply Co. in the 1890's. This was a consolidation of four of the city's older plants, for the trade was growing. Then there were the soda water bottling businesses of Louis Hilleman, William Link, Henry W. Wills, and the firms of Laney Brothers, Gruber Bottling Works. As in other cities, many of them bottled beer, also. All were active in promoting the interests of their chosen field. These were but a few of the 51 bottling shops making up the trade in Philadelphia in 1900. Its growth had been fast, too; from 13 in 1880, and 31 in 1890.

A roster of the Allegheny Bottlers Protective Association for 1882 listed the following in the soda water trade there during that year: J. C. Buffum & Co., Thomas Murray, Charles Friel, S. Shinneller, J. & D. Miller, J. Clark, F. Hampe, John Schweinhardt, Geo. Eichler, Wm. Tann. F. Von Hott & Co., with "Charm" root beer, was another of Pittsburgh's plants prior to 1900. There were 10 plants in the city in that year.

In 1889 a bottling plant was built at the Cloverdale lithia spring, at Newville, Cumberland County, Pa., to use the excellent water which was already famous as the official drinking water for the U. S. Senate in Washington, and shipped to points as far as the Panama Canal Zone. Bottling started on a new line of "Cloverdale" ginger ale, limes and lithia, root beer, lemon soda, and sarsaparilla. The bottled drinks went to the Harrisburg and Philadelphia markets by railroad. Later, in 1914, the business was acquired by Pannill Martin, of Baltimore. It was in 1889, also, that George and William Kountz founded the Red Raven Corporation, near Cheswick, Pa., for the bottling of "Billy Baxter" ginger ale.

BALTIMORE AND WASHINGTON

Of Maryland's 36 bottling plants in that year, Baltimore City had 24, to serve its population of slightly more than half a million. Ginger ale was a popular item there, and it was during the preceding decade that the famous "Gosman" brand was started by Dr. Gosman and Gosman Ginger Ale Co. The "Champion" line of Phillips Brothers, and J. Henzerling's "Challenge Brand" of "sparkling, aromatic ginger ale" were others.

And in the twenty-five years which had elapsed since the end of the Civil War, the bottled soda water business in Washington had passed into new hands. Prominent among its bottlers serving the National Capital, with its 279,000 population at the turn of the century, were Samuel C. Palmer Co. of Georgetown, Hermann Bottling Works, and the Arlington Bottling Works. All of these were to continue well into

the 1900's. And for a while during the eighties, it would appear that Washingtonians were introduced to a bottled mint julep, produced by J. H. Magruder, under the brand "Metropolitan Club."

THE SOUTHERN STATES

States south of the Capital, during the years prior to 1900, were still suffering from the economic effects of the War and the Reconstruction Period, and progress in the soda water trade was slow. As an example, the populous New Orleans in 1880 had but 7 shops in the bottling trade; 8 in 1890; and in 1900 there were 11. In Richmond, during the same period of time, the number had increased from 3 to 6, while in Mobile only 3 were operating in 1900; there had been 6 in 1890.

In the group of States including Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia the industry was particularly slow to expand, for by 1900 they averaged but 1 bottling shop to each 70,000 of the population, with a total of 209 bottlers. Texas, on the other hand, in that same year had one shop for every 22,000 of its population; a total of 139.

Yet the rapid progress the southern States were to make, and the dominant position which they were to take in the bottled refreshment field in the twentieth century, were forecast in those last few years of the 1800's. It was early in the eighties that "Coca-Cola" was compounded and marketed in Georgia by Dr. John S. Pemberton, as a fountain drink. His successor, Asa G. Candler, of Atlanta had, by 1892, incorporated The Coca-Cola Company and started an aggressive program of merchandising the novel product, which he termed a nutrient beverage and tonic.

Bottling of Coca-Cola for distribution in a limited territory began first in the bottling shop of Joseph A. Biedenharn, of Vicksburg, Mississippi, in 1894. Expansion of the bottling operation did not come until 1899, when the company granted rights to bottle and sell Coca-Cola in practically the entire continental United States to Benjamin F. Thomas and Joseph B. Whitehead. Their first plant for bottling Coca-Cola was set up in Chattanooga that year, and the second in Atlanta in 1900. It was a modest start, for within a few years there were to be similar plants operating in hundreds of the Nation's cities and towns, with Coca-Cola taking a position of leadership in the American soft drink industry, and an item familiar to consumers throughout the world.

And these same closing years of the 1800's must be recognized for the initial start of other carbonated drinks which would become important factors in the South, and later throughout the country. In 1885-1888 the drink "Dr. Pepper" had its beginning in Waco, Texas, by R. S. Lazenby, and during the years which followed it, too, became prominent in the trade, especially in the southwest. "Pepsi-Cola" also began at this time, first made at New Bern, North Carolina, by Caleb D. Bradham, about 1896.

MID-WESTERN EXPANSION

As the industry statistics show, the mid-west and western cities were sharing in the rapid expansion of the business, with their bottlers of the carbonated waters giving much evidence of being advertising and brand conscious. Popularity of their products was being advanced, also, by their frequent designation as "temperance drinks."

It was about 1880 that James Vernor, in Detroit, found that his special formula for ginger ale, developed in the drug store he opened following active service in the Civil War, had greater prospects than the druggist trade. And from then on he specialized in it, named it "Vernor's" ginger ale, and made it a local institution. For Detroit competitors he probably encountered Cronk & Kirtz, bottlers of "Dr. Cronk's" sarsaparilla, and the Coffin & Wood Chemical Company, who were producing a celery phosphate beverage, and extract.

Sachs, Pruden & Co. had introduced their "America's Favorite" brand of ginger ale in Dayton, Ohio. John Klee & Son, and the Buckeye Bottling Co. were in Dayton, too. Grant & Upton were among the new firms in Columbus.

In Cincinnati, among the 15 shops of the 1890's, the firm of W. T. Wagner's Sons, with its popular line of "Wagner's" sodas, already had many years history behind it (started 1868). Two of their local competitors were Knuwener & Verhage, and A. C. Gilligan.

In Louisville the well known drinks included the "Diamond Label" line of Klee, Coleman & Co., and the products of Wm. Springer & Sons.

Carse & Ohlweiler, of Rock Island, Illinois, also were well established with their "Black Hawk" brand, and others in that general area included Andrew Lohr, of Cairo, and J. F. Yunker & Co. of Lafayette, Indiana.

The thirty bottling plants operating in St. Louis in those later mid-Victorian years included such prominent names as Ackerman Soda Water Company, H. Wetter Soda Water Company, Schleiper & Graf Co., the Meyer & Meinhardt Bottling Company, and the Eclipse Carbonating Company.

In Chicago, the metropolis to the north, progress also was being made. The number of bottling shops had increased to 13 in 1880, to 18 in 1890, and as the new century opened it had 44 plants in operation with the value of annual production estimated to be \$1,500,000.

The bottling shop of W. H. Hutchinson was, of course, still in operation, and during the seventies and eighties the newcomers in the area included such firms as Sass & Haffner, and Hayes Brothers, both makers of bottled soda water and ginger pop. A. & V. Hoffman were producing their bottled "Buck Soda." Somewhat later F. C. Lang & Co. entered the Chicago trade.

By the earlier years of the nineties John A. Lomax and others had organized the Chicago Consolidated Bottling Co., which was prominently identified with the local soda water business, selling a line of "Eclipse" bottled sodas, as well as a drink called "Nayeau Tonic." A

little later the Victor Barothy Bottlers' Supply Co. produced a carbonated drink called "Tangerette," and Sprague Warner & Co. introduced their line of "Richelieu" bottled drinks. The Consumers Company started marketing a ginger ale in the later years of the decade.

In Milwaukee, J. Graf was featuring his "Silver Sand Spring" line of soda water, and competing with bottled sodas of the E. L. Husting Company. At nearby Waukesha, the sources of its natural mineral waters were being used and promoted by several, including the White Rock Mineral Springs Co., Arcadian Mineral Springs Co., and the Bethesda Mineral Springs Co. And each of these produced carbonated drinks under its own name, in bottles, mainly ginger ale.

At St. Paul, late in the nineties, Drewry & Sons bottled a product they named "Limetta." Just a few miles away at Shakopee the firm of Jacob Ries (1830-1911) had added "Krabina" to its principal line of "Rock Spring" mineral waters and carbonated water.

Somewhat further west, by 1885 the firm of Chesterman & Barrow, already long in the business, had moved, this time to Sioux City, to expand their trade in "Hawkeye" sodas, or "pop," as such drinks were more popularly known in many places. The firm later became Chesterman & Lane Co., and in 1901 the Chesterman Company. Directed by the founder's son, C. B. Chesterman, the firm became well known throughout the west.

At Cedar Rapids, about the same time, J. L. Billan had his own bottled specialty, called "Bavarian Cream Sherbet Soda," while still further west, in Colorado, the Manitou Mineral Water Company had started its business of marketing bottled mineral water and making ginger ale under its "Manitou" brand. Already, the firm of H. Denhalter & Son, was well known at its location at Salt Lake City, but even in the nineties the rate of expansion in the west and on the west coast was still at a slow pace. Salt Lake City, for example, had 3 soda water shops in operation in 1890; by 1900 the total was 4. In 1890 Denver had 4; in 1900 there were 6.

ON THE WEST COAST

On the coast in 1880 Los Angeles was a small community of 11,185. By 1890 it had grown to 50,400, and it had 3 bottling plants. By 1900 the number had increased to 5, population had doubled.

San Francisco, of course, was the population center of the west coast with its 343,000 people, as the twentieth century began, and 20 soda water plants.

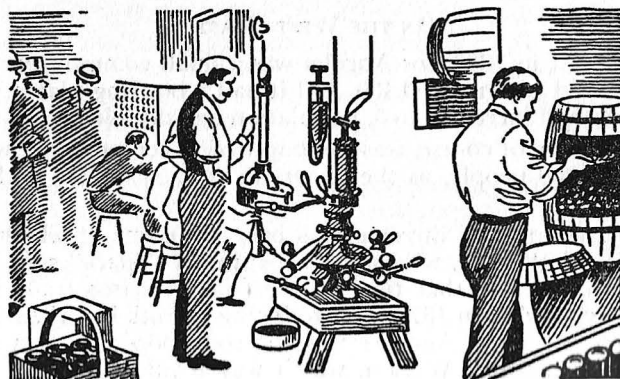
This represented an increase of 5 over 1890, one of which was the shop of H. L. Wagner, who started his line of "Spark" soda water in 1899. One older of that time in the San Francisco trade is shown as A. S. Taylor who, in 1872 was producing a drink he called "Taylor's Champagne Nectar." Another was the soda pop and soda fountain business of Martin Z. Watson, which was acquired in 1880 by John Mulhern, whose name has since been prominently identified with the industry on the west coast.

During the 1885-1900 period the San Francisco roster of bottling plants included the Crystal Soda Water Co., California Soda Works, Pioneer Soda Works, San Francisco Soda Works, Bay City Soda Water Co., Belfast Ginger Ale and Soda Co., Eureka Soda Works, Pacific Soda Works, and Nonpareil Soda Works.

TRANS-ATLANTIC GINGER ALE

It seems clear from the foregoing brief outline of the later years of the 1800's that ginger ale was the most popular type of bottled carbonated drink with the American consumer. It was the natural result of a long period of acceptance and growth, based in large part upon the general excellence of the imported types, which were early in the field. And then, of course, there were numerous efforts at their duplication in this country, and many new types also were successfully developed.

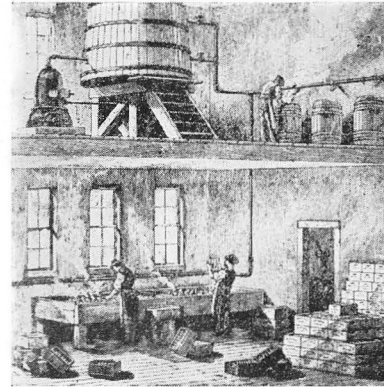
Yet a considerable volume of the bottled ginger ale and mineral water was imported. In the decade preceding 1900 the imports of mineral waters from abroad, duty free, averaged almost two million gallons each year, valued at half a million dollars. There was a duty on ginger ale, but during the same period the annual imports averaged almost three hundred thousand dozen bottles; valued about two hundred fifteen thousand dollars. The better known importing firms included Cantrell & Cochrane, one of the first in the American trade, and Bewley & Draper, both of Dublin. English firms included N. A. Ross & Co., the Apollinaris Company, Ltd., Zoldone Co., and Burroughs Wellcome Company, all of London.



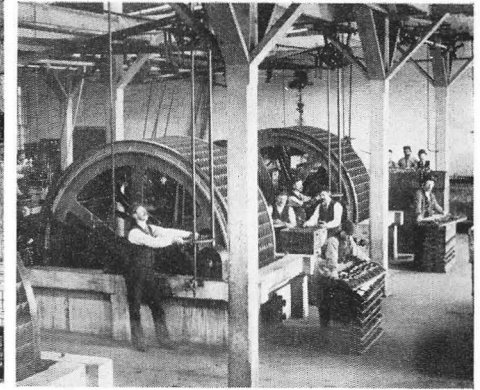
The Early Bottling Shop

PART IV

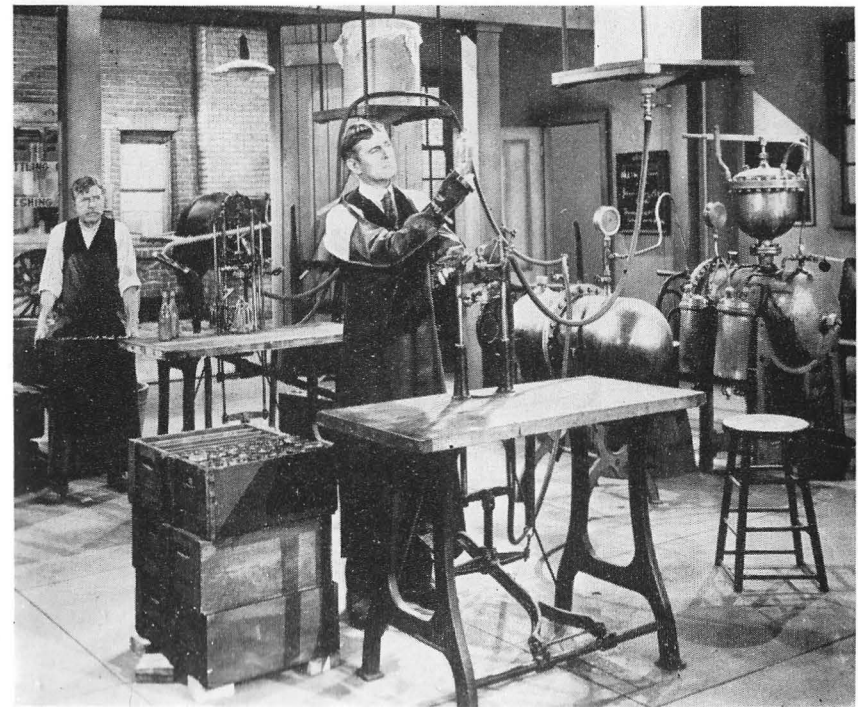
The American Industry in the Twentieth Century and Its Commercial Development, 1900 - 1957



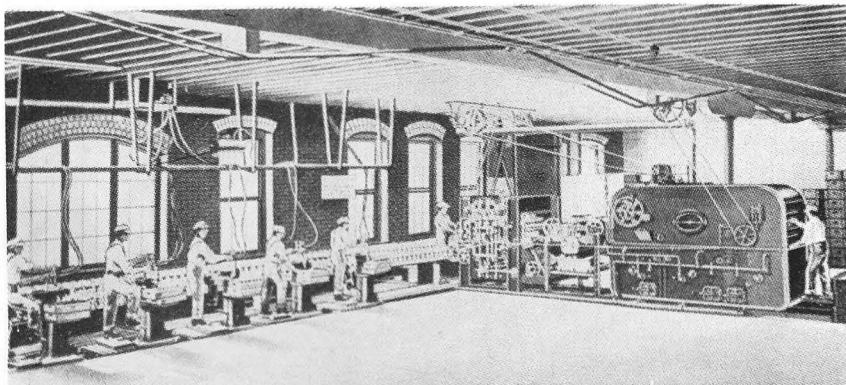
Bottle Washing Department—1885.



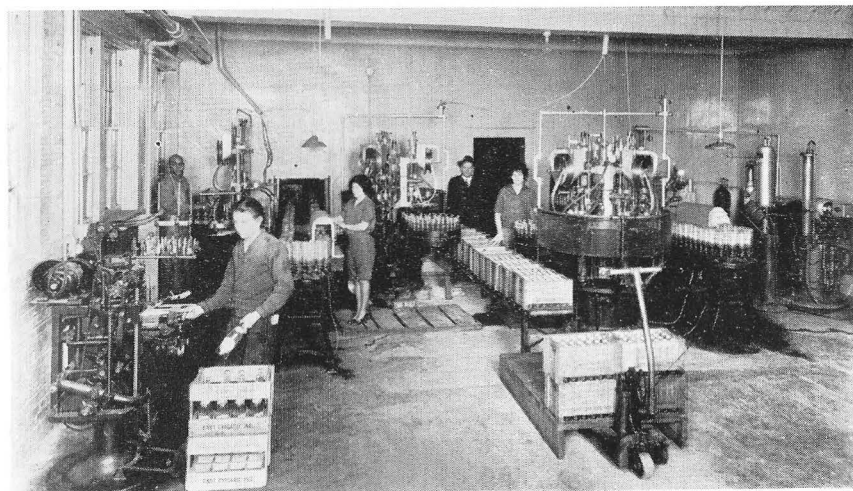
Nordberg Wheel Bottle Washer—1893.



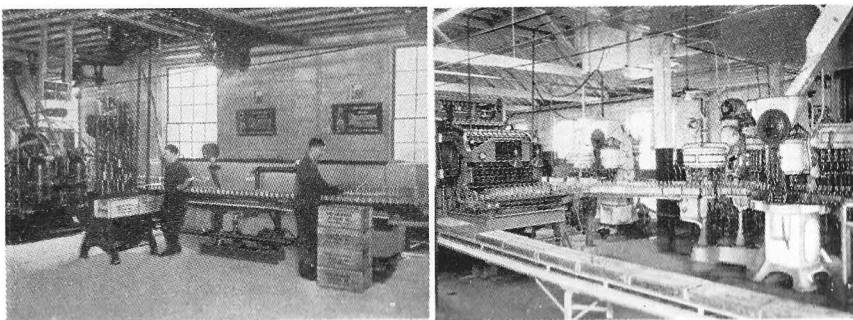
Typical of the Bottling Plant of the Late 1800s.
From Film "Refreshment Through the Years" (The Coca-Cola Company—1940).



The 1905 Bottling Plant.



A Bottling Plant of the Early 1920's.



Two Bottling Plants of the Late 1920's.

PLANTS OF THE 1900-1930 PERIOD

15

Beginning the New Century

1900 - 1920

EARLY BUSINESS DEVELOPMENT

By the beginning of the new century the industry had grown to rather substantial proportions, with a recorded total of 2,763 operating bottling plants, and an annual production of about 39 million cases of its bottled drinks. This meant an average per capita consumption of 12 bottles annually, or eight times that of the first year of its recorded history—1850.

Nevertheless, even as late as 1900 it didn't require much capital to go into the business, as the figures show average investment in the plant of that period was only \$7,140. But there were hazards, for not only was an era of expansion getting under way, with the revolution in its mechanical facilities, outlined later, but its obvious potentials for growth were stimulating competition, which eventually would cause vast economic changes.¹

In 1898, as an incident of the Spanish-American War, the first threat of a special Federal tax on ginger ale and soda water had been faced, and successfully avoided. Close connection of the bottled drinks with the saloon and its main attractions offers a likely explanation for that threat.²

True, of course, the soda fountain was still the principal competitor of the soda water bottler, and more than 70% of all soft drinks were sold at the soda fountain; in the 80's and 90's the proportion was even higher. But bottled drinks were making progress. Direct home delivery was no doubt one reason for the increasing consumption of the bottled product, for its distribution by or through the corner grocery was still in its infancy.

THE SALOON

In many areas the saloon was one of the main outlets for the bottler's products, and it was an important one. In some communities as much as two-thirds of the bottled drinks were sold through the saloon. A factor contributing to this was the large proportion of bottling plants in which the bottling of beer also was carried on, with soda water as something of a side line.

The saloon proprietors didn't take too kindly to the efforts to market the nonalcoholic—or soft—drinks, and did little to promote their sale. The effects of this, and the primary interest which many of the bottlers had in the sale of their bottled beer, were recognized by many as impediments to the rapid advancement of the soda water end of their business. It was to be a problem of the industry until Prohibition, but other changes were taking place, also.

Apollinaris,³ an imported carbonated mineral water, and a wide variety of artificial mineral waters were important products of the soda water bottler, as well as of the soda fountain, all through the 1800's and well into the early years of the new century. But with the possible exception of seltzer, so popular as a table water in metropolitan areas, and in the saloon trade, they were beginning to lose ground. There was a growing preference for the flavored drinks.

NEW DRINKS APPEAR

And, in addition to the more common flavors in the red, white, black, and brown line, new flavors were being introduced—the early proprietaries. Coca-Cola was among the first, with its bottling growing rapidly in the south during the earlier years of the 1900's.

As mentioned previously, Coca-Cola was first bottled in 1894, but bottling generally started under a franchise-contract with Benjamin F. Thomas and Joseph B. Whitehead, of Chattanooga, in 1899. Their Chattanooga plant started operation in that year; another was opened in Atlanta in 1900. By 1904 the annual sale of Coca-Cola syrup had reached 1 million gallons, and there were 123 plants authorized to bottle the finished drink.

Moxie in the northeast was another example of a popular innovation. And, in the southwest, Dr. Pepper had made its debut in Waco during the same period. Hires root beer, long advertised and sold in extract form for making in the home, was first bottled in Philadelphia about 1897. The original Pepsi-Cola Company was organized in New Bern, N. C., in 1903.⁴

Of all the bottled drinks of the period, however, ginger ale could be said to head the list in popularity—at least in those areas in which bottled soft drinks were common items of trade. The imported types had been long known, but American brands were emerging from a lengthy period of development both as to quality and popularity, and they were growing by leaps and bounds. In this they no doubt shared with other packaged food items the increased confidence of the consuming public coming from enactment of the Federal Food and Drug Act in 1906, and subsequent enforcement of its provisions against misbranding and adulteration of food products.

Outstanding as an example of this growth in early popularity in the bottled soft drink field was Clicquot Club. With purchase of the company in 1901 by Horace A. Kimball, textile manufacturer of Providence, came the active management of the company's affairs by his son, H. Earle Kimball, for a period of several decades. From a business which was largely confined to areas within hauling distance,

he soon broadened its scope, selling the product through wholesale grocers. In this way distribution of the product spread first through New England, then to New York, New Jersey, and other Middle Atlantic States, and ultimately on toward the Pacific Coast.

Coca-Cola had, of course, started its national advertising of the fountain drink earlier with its advertising budget for 1901 reaching the exceptional total of \$100,000. Coca-Cola in bottles was featured in newspaper advertising for the first time in 1902; a campaign of advertising in general magazines was begun by The Coca-Cola Company in 1904. Clicquot Club Company was perhaps the first to use national advertising on a substantial scale in the promotion of bottled ginger ale. In 1907 consumers throughout the country were told about the product in 25 national magazines.

It was a period of novel experiment, and was to bring startling results. One of America's infant industries was beginning to grow up.

MORE GROWTH—NOVEL DRINKS

During the first ten years of the new century the growth of the industry was typified by rapid expansion in the number of its bottling plants. During this short period the total of its plants practically doubled. The influence of the soft drink bottler in the beverage field progressed to the point where he became the predominating influence in planning its future, while that of the beer bottler rapidly waned.

Soft drink bottling was still primarily a business for summer only. Many plants locked their doors after Labor Day, and didn't open again until the warmer days of spring. Sales depended largely upon the need of the consumer for refreshment at those places convenient to him. Increasing popularity of resort areas and the availability of automobile transportation to the greater numbers of people served to create rapid change in the nature of the industry's outlets, too, and the corner store and the roadside stand took on greater importance as the place to stop for a cold bottle of "soda."

This effect was greatly extended, with the replacement of the horse-drawn delivery wagon by the motor truck. The years 1913-1915 were a period of action in that direction. Manufacturers of trucks such as the White, Stewart, Mack, Federal, Garford, International Harvester, Autocar, Packard, and others found the local soda water bottler a good prospect for use of the motor vehicle instead of horses, and the coming of good roads did much to hasten the transition, expanding the area in which the bottler was able to deliver his drinks.⁵

At the same time, the business of the national shippers of the industry's most prominent product—ginger ale—still tended to dominate the trade, for there was a substantial number of popular and widely distributed brands, including Clicquot Club, Cloverdale, Sheboygan, Beaufont, Beech Nut, Gosman's, Cantrell & Cochrane, and many others, the manufacturers of which shipped their products in carload lots to wholesale grocers all over the United States. White Rock and Poland Spring Waters, also were in this category. Local brands of ginger ale were popular in many cities, and provided stiff competition

for the national shippers; Buffalo Rock, of Birmingham, and Vernor's, of Detroit, were good examples.

The bottlers of a community and their private brands were vital factors in the local trade, and provided the bulk of the bottled drinks for on-premise consumption. Bottled Coca-Cola steadily increased in importance during this period, although centered largely in the southern States. And its success was exciting new competition.

Celery Cola, Koca-Nola, Gay-Ola, Roxa-Kola, and others were being advertised to the trade for bottling, early in the new century. Chero-Cola made its appearance as a product of the company of that name organized in 1912 at Columbus, Georgia, by Claude A. Hatcher, long identified with the industry.⁶

Prior to 1910 a long list of novel drinks attracted the bottler's attention, such as Iron Brew, and Ironbeer, Phospho-Brew (Twitchell's iron phosphate drink), and a drink named Marrowfood. Peppo-Ade and Pepsin-Ola were others. And in those early years, serious effort was made to popularize peach drinks, such as Peach Mellow, and Peach Bounce. Barq's root beer, and the Cascade brand of ginger ale manufactured by the Monarch Manufacturing Co. of Atlanta, also should be listed for this period.

During the years 1910-1920 the entry of more new drinks into the trade continued at a rapid pace. The introduction of Delaware Punch, Grapine, Grape Julep, Grape Mist, Champagne Mist, and Grape Smack is evidence of the popularity of grape flavor during those years. Cherry Blossoms, Cherry Smash, Cherry Julep, Lime Cola, and Green River, also show a preference at that time for the cherry and lime flavors.

One of the newer types of drinks to come a few years later, beginning about 1915, was the so-called cloudy orange. Orange Crush was among the first in this field, in 1916. But it faced plenty of competition with older orange drinks already in business, including Orange Smile, Orange Julep, and Orange Whistle. And then there were the many which came during the next few years, such as Orange Squeeze, Orange Kist, and Howdy.

WARTIME PROBLEMS AND ORGANIZATION

With the entry of the United States into World War I, in 1917, the natural effect of the materials' scarcity and increasing costs became a problem which impeded the industry's progress during the remainder of the decade. To this may be added the effects of a 10% Federal excise tax on soft drinks, levied as a wartime measure beginning in February, 1919.⁷

It was a result of the restrictive problems of wartime and the destructive effect of the Federal tax that brought to a point of final action the changes in industry organization which had been discussed for many years. In 1918 the National Bottlers Association, as an exclusively soft drink association, superseded the older American Bottlers Protective Association, with the wartime taxes and adjustment of other restrictive wartime measures as its immediate objective. Further

reorganization in 1919 initiated the American Bottlers of Carbonated Beverages; James Vernor, Jr., of Detroit was elected its first President.

THE 1920 STATUS

As mentioned previously, in numbers the bottling plants almost doubled during the first decades of the century, although almost all of that increase occurred during the first ten years. More than 5,200 plants were operating in 1920.

However, growth of production and bottled soft drink sales were extraordinary in the later years of the period. The newer types of bottling machines could produce 100 bottled drinks per minute, and this was important. From a production of approximately 65,000,000 cases in 1910, the total had increased to an annual production level approximating 175,000,000 by 1920.

The consumer was rapidly becoming familiar with the effervescent product in bottles, in a wide variety of flavors, as America's national drink, and the industry was attracting new capital for the period of even more rapid growth ahead. In 1919 The Coca-Cola Company, of Atlanta, was sold by the Candler interests to a group headed by Ernest Woodruff for \$25,000,000, reincorporated as a Delaware corporation, and its stock put on public sale at \$40 per share.

COMPOSITION CORK AND THE CROWN

Perhaps no greater progress in industry packaging practice has been made than that during the earlier years of the Twentieth Century coming from adoption and use of the new bottle crown. And its promotion and use was intensified with the expiration of the original Painter patent rights in 1909. Within a few years several new manufacturers of the bottle crown had entered the field.

Of much importance to the new period in soft drink bottling, therefore, was the invention by Charles E. McManus, of a composition made up of ground cork particles which would be suitable as a liner for the bottle caps, and less costly to use for that purpose than the whole cork.

In 1912 McManus organized the New Process Cork Company to manufacture his "Nepro" composition cork discs, and opened a factory in New York City. There his new type of liner was inserted in crown shells manufactured by others. Later, in 1916, at a new plant in Brooklyn, manufacture of the entire crown, including the "Nepro" discs, was undertaken, and many other improvements in crown manufacture developed by him were installed.

In 1925 the business of the International Cork Company, also of Brooklyn, was acquired by the "Nepro" organization. Then, in 1927 the Crown Cork & Seal Company was merged with the New Process Cork Company, with McManus as President. The Crown Cork & Seal Company name was continued for the new organization.

The industry's transition to the crown closure was completed, for all practical purposes, during the years prior to 1920, and since that year the crown has typified the bottled soft drink industry in America,

with no other types of closures being used. Glass manufacturers approved a standard for the crown finish bottle in 1923.⁸

With the coming of the crown closure, it was immediately used also as means of designating the flavor of the bottle's content, a feature not practical with the cork and other closures previously in use, although some attempts had been made to impress brands upon the corks used, and to develop a branded tinfoil cap to fit over the cork and bottle neck. Thus, the first crowns produced in the 1890's were decorated crowns, designating the flavor or type of product on which they were to be used. Paper labels, too, were in common use for the same purpose. While the paper label was to continue as a common item of use on many products, it had its drawbacks and the search for other identification means began early.

Glass bottles, even for many years before the advent of the crown closure, had been molded to show the name and location of the beverage bottler. No doubt misappropriation of bottles, and their use by competitors influenced early use of this means of showing ownership, supplemented later by the designation of the bottler's brand or product trademark. And, with the growing importance of brand recognition in the effort to expand individual product sales, a novel form of identification was developed in the shape of the bottle itself—that is, in its design.

THE SPECIALTY BOTTLE VOGUE

Glass containers of special form, configuration, or surface design were long known, but the development of a beverage bottle of such unique design that it would serve to identify the product contained in it did not assume particular importance until the Coca-Cola patented bottle became widely used, following its introduction in 1915-1916.

The patenting of the design of the Coca-Cola bottle in 1915 thus opened a new period and a new type of activity. While a few more followed almost immediately, the 1920-1930 decade were years when hundreds of bottlers endeavored to solve their container problem by adopting a bottle of unique styling. Their purposes, of course, included the ready identification of their product and greater protection against bottle misuse by others, features which were inherent in the distinctive container.

In was during this period that the proprietors of such prominent branded drinks as NuGrape, Orange Crush, Try-Me, Chero Cola, Whistle, Orange Kist, Dr. Pepper, Double-Cola, Howdy, and many others adopted special designs of bottles for their products.⁹ Others, notably products of national shippers such as Canada Dry and Clicquot Club, continued to depend upon the paper label as their branding medium.

16

Expansion in the Twenties

1920 - 1930

THE PROHIBITION YEARS

Progress made by the bottled soft drink industry during the years of Prohibition under the 18th Amendment, which began in January, 1920, has been credited by many to the absence of beer and alcoholic liquors from the lawful market. Many others, however, with adequate reason have maintained that the high increase in soft drink consumption during the 1920-1930 decade was due alone to the increased efforts in promoting and merchandising the industry's products.

Nevertheless, Prohibition did bring with it novel aspects in the manufacture and sale of the nonalcoholic drinks. Some of these, such as the elimination of the saloon, and the appearance of dealcoholized beer (or "near-beer") as a competitive product, had little deterrent effect upon progress of the flavored drinks. On the other hand, the Prohibition period does mark the beginning of some changes in soft drink consumption habits in the United States.¹

DRY GINGER ALE

To some degree this may be attributed directly to the Prohibition era, for it brought demands for a mixer, or vehicle to mask the unsavory taste of the various unlawful alcoholic concoctions frequently offered to consumers. To this has been attributed the quick acceptance of the dry types of ginger ale which appeared in volume during the twenties, and popularized by Canada Dry, first imported in 1921 from Toronto, Canada, where it had been made for many years by J. J. McLaughlin, Ltd. In contrast with the sweet, golden ginger ale, the dry ginger ale was lighter in sugar content, heavier in lemon flavor.

In 1922 the American corporation, newly organized, opened its first U. S. bottling plant in New York City. In 1923 P. D. Saylor (1879-1941) and associates purchased the business, operating as Canada Dry Ginger Ale, Inc. Other plants were soon added at Hudson, New York, and Maywood, Illinois. Then in 1928 Canada Dry acquired the New York City plant of G. B. Seely's Sons, Inc. It was from these centers that the new-style ginger ale was shipped to the national market, in nonreturnable bottles, to supply the demand created by extensive advertising.²

Popularity of the dry ginger ale increased rapidly, and because of its suitability for the particular purposes, tended to supersede the beverage type of golden ginger ale as a major industry product. Its success,

of course, was reason for the prompt appearance of scores of other brands of "dry" ginger ale on the market, including products of the other national shippers, and the local brands.

The same period also brought with it the use of new promotion methods, and modification of older ones. Among the former was radio broadcasting, a new advertising media. Clicquot Club, for example, was one of the first to use the radio broadcast; its "Eskimos" overture of 1925 is recognized as the first of the commercial signatures identifying product advertising on the radio. The advertising slogan, also, became prominent in the trade. Coca-Cola first used its "The Pause That Refreshes" in its advertising in 1929.

GRAPE DRINKS AND OTHERS

Other new products, too, made their appearance. Orange Crush, Howdy, Orange Kist, and other orange drinks started in this general period, and became popular. Nehi, a new line of the older Chero-Cola organization, was introduced in the early twenties; the Try-Me line of flavored drinks was another.

Grape drinks entered their cycle of growth early in this new decade, with such popular items as NuGrape, Good Grape, Grapico, and Bluebird. Nuicy, Brandimist, and Brandywine were widely advertised to the trade. The Emerson Drug Company, of Baltimore, tried to interest bottlers in its Ginger-Mint Julep, and the Whistle Company of America, of St. Louis, advertised for franchised bottlers to take on its Vess Dry ginger ale.

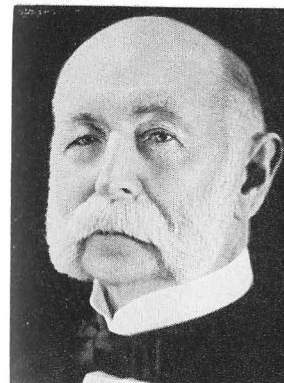
NuGrape was developed at the small bottling plant of Kelley Brothers, in Atlanta, in 1920. In 1921 the NuGrape Company of America was formed to franchise bottlers and market the drink; management was by O. R. Randall for several years.

Dr. Pepper, also, having moved to Dallas in 1922, reorganized as the Dr. Pepper Company in 1924, and started a program of franchising bottlers in 1926. Seven-Up was introduced late in this period (1928) by C. L. Grigg, of the Howdy Company, which he had started in 1920. These involved other developments in the industry's methods of doing business, as well.

CHANGES IN BOTTLE SIZES

Sizes of bottles used for the soda water of the 1800's were numerous, but with wider use of the crown closure and the coming of the machine-made bottle early in the new century there was greater reason for some trend toward uniformity of size. During the first two decades two capacity sizes predominated, the 6 or 7 oz. bottle, called the "split," and the "family size," being the quart or approximating it in capacity. Some pints and half-pints also were in use.

In the early years of the twenties the entrance of numerous new products into the field intensified the competitive factor of quantity in the smaller, or "nickel" size. The eight-ounce, or half-pint was the first to be offered in quantity; about 1924 the nine and ten ounce sizes were added. And beginning in the depression years of the early thirties the twelve-ounce bottle, also priced to retail at a nickel, was



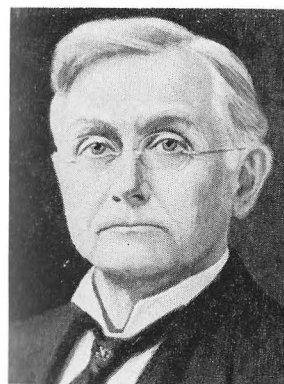
James Vernor, Sr.
1843-1927



William B. Keller, Sr.
1852-1929



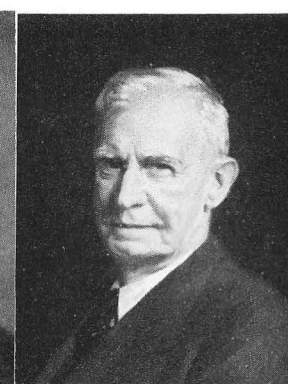
Charles E. Hires
1851-1937



Asa G. Candler
1851-1929



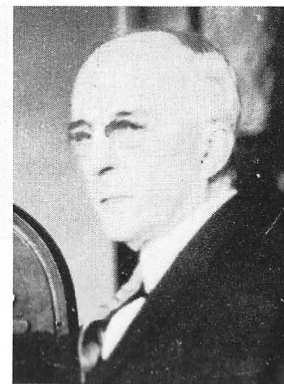
Ernest Woodruff
1863-1944



Joseph A. Biedenharn
1866-1952



Caleb D. Bradham
1867-1934



Donald A. Loyless
1871-1931



H. Earle Kimball
1881-1952

I. SOME 20TH CENTURY INDUSTRY PIONEERS



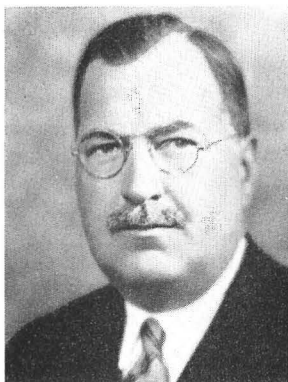
Claude A. Hatcher
1876-1938



Charles L. Grigg
1868-1940



Hugh J. McMackin
1881-1950



P. D. Saylor
1879-1941



J. B. O'Hara



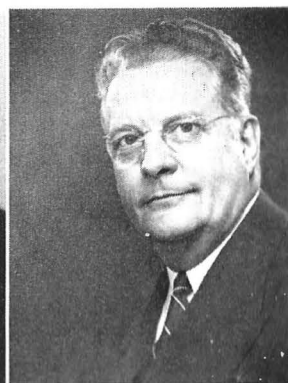
Charles G. Guth
1876-1948



R. W. Woodruff



Henry R. Bafetti



Harrison Jones

II. SOME 20TH CENTURY INDUSTRY PIONEERS



SPECIAL BOTTLE DESIGNS: 1920's and 1930's

introduced and made substantial progress during the succeeding years; by 1935 it represented about 5% of total production.³

IMPROVEMENTS IN VENDING

It seems quite obvious that the industry's progress in its development of productive facilities during the early decades of the new century, was not accompanied by similar advancement in the means for vending its product. This could be attributed to concentration on the many other innovations being introduced, and on other phases of developing and promoting its products during a period having a high potential for rapid growth.

In the early twenties, bringing Prohibition and disappearance of the saloon, every corner grocery and neighborhood candy shop assumed even greater importance as a place of ready refreshment, with bottled soda water and the growing number of specialty soft drinks. Tubs in which the bottled drinks were iced, before sale for drinking on the premises, was the common method, as it had been for a generation. Some progress had been made for improvement in that direction, and the more presentable and efficient form of box cooler was among the first.

From about 1924 forward, however, the obvious need for better means of presenting bottled drinks, and for cooling them, started a long period of development of the numerous types of coolers which became typical of the later decades.

THE NEW COOLER

Among the first of these was the all-metal cooler made by the Glascock Manufacturing Company on order of the Liquid Carbonic Corporation, owner of the patent. Introduced in 1924, it was a square metal box of substantial proportions, within which a series of parallel tubular loops extended from the top of one side downwardly into the ice chamber, and to the top of the other side. Bottles inserted at one end formed a continuous line through each tube, for cooling. By inserting a bottle in one of the tubes, therefore, its line was pushed forward, and a cold bottle could be removed at its other end.

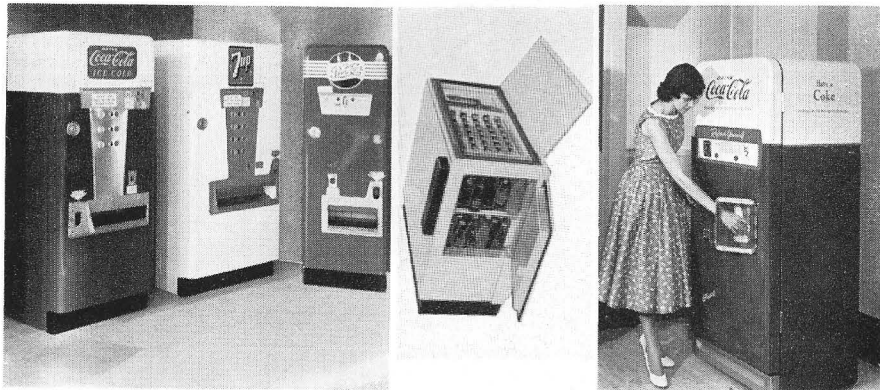
The "Icy-O" cooler, of this same period, manufactured by the Icy-O Company, of Baltimore, was another example of the innovations introduced to the trade during this period, and also found wide use in the retail outlets.

These were among the first of many, in later years including the electrically refrigerated wet cooler, and later the dry cooler which was found to have added sanitary features. The depression years, and the wartime period 1941-1945 stymied further progress of startling proportions, and it was not until after the metal shortages and restrictions of those later years that adequate attention could be given to the industry's growing needs for more efficient vending.

And, as previously pointed out, there were other advances in the industry's mechanical operations, and in the equipment. This was furthered by annual exhibits beginning in 1921, sponsored by the new association, American Bottlers of Carbonated Beverages. Previous



NEW BEVERAGE COOLERS FOR THE RETAILER: 1925-1930



Automatic Cooler-Venders of Mid-Century (Bottles and Pre-Mix).



Bottled Soft Drinks An Important Refreshment Item At Grocery Stores and Other Outlets.



shows of equipment and supplies had been conducted during the 1882-1886 period by the U. S. Bottlers Protective Association. In 1914 an exhibit was held at the meeting of the A.B.P.A. Exhibits at the 1919 and 1920 meetings were held under private auspices. From 1921 on, however, the annual exhibits were conducted by the association and its associate members in the supply trades, and have done much to stimulate progress in mechanical equipment and the many other facilities used.

ADVERTISING AND TAXES

It was during the later years of this decade, also, that A.B.C.B., acting for the industry, embarked upon its first major cooperative promotion effort, involving the subscription by bottlers to an advertising fund approximating \$1,000,000. The program, extending through the 1926-1929 period, extolled the beneficial properties and attractions of bottled carbonated beverages. Advertisements appeared in national magazines and the major metropolitan dailies.⁴

The period was not without its difficulties in other directions, however, for despite the modification in 1921 of the Federal 10% wartime tax on bottler's sales of his products, by the substitution of a 5¢ per gallon tax on syrups and a 4¢ per pound tax on carbon dioxide with repeal of the latter in 1924, other taxation problems almost immediately arose on other fronts. State legislatures, early in the twenties, made many proposals for soft drink excise taxes at the State level. With the exception of the 1¢ per bottle soft drink tax in South Carolina, enacted in 1925, none of these early proposals were enacted, but the threats continued during the years which followed, and some were later put into effect.

INDUSTRY STATUS

The problems of the twenties are reflected in the industry's failure during that decade, to maintain the rate of progress shown in prior years. Yet it did advance materially. Annual production increased from the 1920 level of 175,000,000 cases to the 272,500,000 case level of 1929, with an increase in per capita consumption from 38 to 53 bottles. And the number of bottling plants reached a new high in 1929, approximating 8,000. But that level was kept for only a short period.

Of special interest at this point is the trend in flavors of bottled soft drinks which developed during the early decades of the Twentieth Century. As the twenties ended, a wide variety of flavored drinks were being bottled.

The crown manufacturers, for example, were producing stock crowns for the following drinks, listed in the order of crown volume viz., kola type drinks, orange, ginger ale, grape, lemon, root beer, strawberry, cream soda, chocolate, cherry, lime, peach, lemon-lime, sarsaparilla, birch beer, and punch. In substantially less volume, were such flavors as raspberry, ginger beer, pineapple, banana, loganberry, teaberry, and pear. No doubt there were other flavors, but these constituted the bulk of the industry's production.

17

Depression in the Thirties

1930 - 1940

THE IMPACT

The economic depression of the thirties had serious impact upon the soft drink bottler, although effect upon the industry was tempered in speed and extent. This has been attributed to the popularity of the bottled soft drink and its being a low-cost consumer item.

In any event, the recession of business generally was reflected in the bottler's operations during the early years of the thirties, and the industry as a whole suffered consistent declines in annual business beginning in 1930. Lowest level was reached in 1932, with a total production estimated as slightly above 141,000,000 cases.

EVENTS OF THE PERIOD

The low level of consumer purchasing power during this period resulted in a decline in production and sales previously referred to. To this, as an additional problem, was the reimposition, in 1932 at the industry's lowest level of sales, of the Federal excise taxes of the post-World War I period—the syrup and carbonic gas taxes. These, however, were of relatively short duration, being removed in 1934.

Competitive difficulties, too, were involved; attractions offered for the consumer's nickels were many. Size of the bottle, for example, was used as a competitive enticement, and with increasing vigor.

Bottled Pepsi-Cola, reorganized under new ownership of the Pepsi-Cola Company, acquired by Charles G. Guth and his associates at Loft, Inc., in 1930, became active in this field in 1931-1934, and was prominently identified with the competitive growth of the twelve-ounce bottle in the trade. Nehi's "Royal Crown Cola," introduced in 12 oz. bottles in 1935, was another.

The lowered purchasing power of the consumer during the depression period of the thirties, of course, added potency to the competition provided by the larger bottles for the same price. Sizes up to sixteen ounces sold for a nickel at retail; and in some few areas the family size was sold at that price.

By 1939 the twelve-ounce bottle size had grown to almost 25% of the industry's production. The war period and its accompanying need

for stretching the lowered sugar supply, and the cost factors of later years, then resulted in some changes in bottle sizes, so that by 1954 the ratio had been modified to about 15% of the industry's total.

PRODUCT CHANGES

New brands and new drinks entered into this competition of the depression, also, with a number of them directly related to the larger bottle being offered. Big Boy, Big Bill, and Double-Cola were introduced in the mid-thirties. Others included the family-size Par-T-Pak of Nehi, and several of the increasingly popular lithiated lime drinks with names such as Upper 10, Pick-Upper, and 2-Way.

Root beer was a feature of this period of innovations, too, with numerous brands entering the trade, among which were Dad's, Twang, Howell's, and Triple XXX.

It was for a while, during the thirties, that bottled chocolate drinks became popular, and were widely manufactured and sold. The brands were many, including such names as Chocolate Soldier, Mavis, Choc-au-lait, Brownie, Chocolate Mello, Kayo, Kremko, and others. Since a milk base was generally used, in most instances pasteurization of the finished drink was required, and this and other technical difficulties tended to impede progress of the chocolate drink as a product of the soft drink bottling plant, along with a decline in consumer demand. The result was a relatively short period of marketing prominence.

THE CARTON DEVELOPS

The industry early adopted the 24 bottle box, or case, as delivery medium for its bottled drinks; its use beginning shortly after 1850. Metal shipping cases were tried during the early 1900's, but were found to be cumbersome, heavy, and expensive. And, while the corrugated board carton of 24 bottles of latter years has served as a substitute to some degree, the wooden delivery case has continued to be one of the mainstays of the industry's delivery functions.

The delivery case, however, has served primarily to transport the bottled products to the retail dealer. Effort to increase home consumption of carbonated beverages early in the twenties soon brought recognition of the need for a convenient means for carrying the bottled products from the grocery store to the home.

The six-bottle carton, frequently referred to as the home-pack, or carry-out, was pioneered by Coca-Cola in 1922-1923, but did not reach general use until several years later.

First made of corrugated board, and later of lighter paperboard, early models packed six bottles in a row; but the double row of three each was found preferable very quickly. Cartons of lightweight metal, to promote repeated reuse, also were tried in a limited way. However, with development of the lightweight paperboard which would withstand several uses, that was substituted and many forms of cartons, elaborately designed for advertising and merchandising purposes as well, have entered into universal use.

Early carton models generally followed the closed box type, but the merchandising advantages of the container were responsible for its early redesign to the tray, or open type, providing for some display of the bottled contents and yet retaining the advertising features of the carton body. Attempts have been made to popularize the 12-bottle carton, some of which were introduced in 1936, but it has not been generally used. Similarly, since 1955, the 8-bottle carton has been used in but a limited way.

From an initial use of approximately 2 million cartons a year during the 1929-1932 period, use of this type of container by Coca-Cola bottlers, alone, by 1939, had reached 70,000,000, and by the year 1941 the industry's annual usage had increased to almost 250,000,000. Restrictions on paperboard during the wartime period curtailed its use, but with the resumption of production following the war the upward climb has resumed. Use of this type of container by the bottled soft drink industry during 1957 has been estimated to exceed 700,000,000.

Since World War II, a growing portion of the industry's total production of bottled drinks, which some estimate as high as 50%, has been packed in the carry-out carton. Actual total of bottled drinks taken into the home by that means are, of course, much greater, since each carton may be used several times. Use for two or three such trips is common; some get a higher rate. And the carton has been recognized as constituting a major contribution to the growth in at-home consumption of soft drinks during the decades following its general use, and to the greatly increased importance of the grocery and food store as the means by which bottled soft drinks reach the consumer.

APPLIED COLOR LABEL

The trend to special design containers ended rather abruptly with the coming of the fired-on, vitreous color decoration of glass bottles, which started commercially in 1934. The term "Applied Color Label," or ACL, became its common designation. With variable and permanent surface decoration of this kind available, performing substantially the same functions as container design, as well as brand and manufacturer designation, the prevention of misuse was also served. As a result many of the designed bottles requiring special molds eventually disappeared from the scene, ACL bottles replacing them. This was particularly true of local private brands. On the other hand, numbers of the established franchise brands continued using the distinctively molded bottles, frequently supplementing the design with ACL decoration.

In 1937 Owens-Illinois developed the first fully-automatic machine for applying ceramic colors to glass bottles in the ACL process.

NEW COMPETITION

Bottle sizes and cartons were not the only novelties in the competition for the consumers' nickels during the years of economic troubles. The apparent success of the refreshment industry in its effort to pull itself out of the trough of the depression attracted others, including

some segments of the dairy industry. During 1936 many of the milk plants added so-called "dairy orange drinks," usually in milk bottles, as an item for their milk routes. Impetus given by this new effort to consumer demand for the orange-flavored drinks in turn was reflected in greater attention to orange in the bottled soft drink field, and the twelve-ounce orangeade, with minimum or no carbonation, became a popular item. Prohibition also brought the development of new products such as orange dry and lime rickey, the latter being a combination of lemon juice, lime juice, and lemon-lime flavor. Both were highly carbonated.

It was the beginning of a period of renewed attention to the potentials of fruit juices as flavoring materials for the bottled soft drink industry. And that was furthered to a degree by objections of food officials to the deceptive nature of some of the orange products being offered, and their labeling. Also important was the need to meet the obvious preference of many consumers for flavors of that nature.

Orange and lemon juices had been used to some extent in the manufacture of bottled soft drinks since the early 1920's; prior to that the soluble flavors had generally prevailed. Use of the juices, however, brought new difficulties related to high susceptibility to spoilage, whether due to their natural character, or from sunlight, or from the novel mechanical problems involved in the syringing-filling operation.

These difficulties were overcome during the 1930's, by changes in the preparation of the juices for the bottler's use, such as by eliminating excessive pulp, and by alterations in the filling equipment. The care required in use of the juices in the finished products also encouraged the highest degree of sanitary maintenance of plant and equipment in the preparation of a product so readily subject to spoilage.

In the development of the juice drinks the industry also had the benefit of skilled technical organizations engaged in the primary preparation of juices from the fresh fruit. One of them, the California Fruit Growers Exchange (later Sunkist Growers), had been engaged in the field since 1919, and provided wide assistance in preparation, stabilization, control, and other techniques which would make possible the wider use of the fruit juice products in the manufacture of bottled soft drinks.

It was in this general period of the thirties that such drinks as Bireley's, Tru-Ade, Squirt, Mission, Nesbitt's, Ju-Cy Orange, Suncrest, Sun Spot, and others originated. Repeal of Prohibition also brought a series of carbonated juice-containing mixers, such as for Tom Collins, Whiskey Sour, Planter's Punch, and other mixed drinks.

Each year many thousands of tons of citrus fruit, much of which is unsuitable for fresh fruit marketing merely because of size or shape, are processed and the juice concentrated for use in the fruit flavored soft drinks. Current estimates (1958) are that in the making of bottled soft drinks alone the annual usage is 150,000 tons of oranges, 5,000 tons of lemons, and 25,000 tons of grapefruit. All of the lemon juice is produced in California, and most of the orange juice; some

of the latter is from Florida. California and Arizona produce the grapefruit juice.

With annual value of the juices thus used by bottled soft drinks approximately 8.5 million dollars, the industry is an important adjunct to the fruit growing industries of those States.

SOME INCIDENTS OF REPEAL

The adoption of the 21st Amendment in December, 1933, and its repeal of Prohibition, had little permanent effect upon the consumption of bottled soft drinks. Temporarily, with the preliminary legislative approval of 3.2 beer in March, 1933, and beer of regular alcoholic content a few months later after the Repeal Amendment, the novelty of the situation and apparent attention of consumers to the product now legal, was disturbing in its temporary effects, but that soon passed.

During the period 1933-1935, the industry, along with others, was subject to the National Industrial Recovery Act, and the regulation of competitive practices by the industry's Code of Fair Competition approved June 7, 1934, and its Code Authority.¹

This tended to correct many destructive competitive practices which were common to all fields in the general selling effort. Price levels were strengthened, with the emphasis on maintenance of minimum wage scales. With the requirement that all bottlers collect a deposit on returnable containers in the trade, for the first time the container deposit system became practically universal.

DISTRIBUTION CHANGES

The nature of the market was changing, also. During the years since World War I, and during the Prohibition period the outlets for the bottled drinks broadened to include the many retail stores frequented by consumers, but more particularly the grocery stores. This latter fact, plus industry efforts to popularize the larger bottles for use at home, contributed to the increasing importance of the grocery store as an outlet, so much so that it was to become the industry's most important distribution outlet within a very few years.

It was the intensity of the competition during the thirties, also, which made further changes in the methods of distribution. Shipment to distant points by the national shippers was found no longer practical under prevailing price conditions, and in the later years of the decade that method of distribution was abandoned virtually in its entirety. Canada Dry and Clicquot Club, for example, in 1938 announced plans for franchising of bottlers for the bottling of and distribution of their products locally. From then on, the bottled soft drink industry became practically 100% local, limited only by the extent of trucking operations from the bottling plant.

Novelties in soft drink advertising were introduced in this period, too. Pepsi-Cola used the airplane for ski-writing its name in 1938. Its cartoon type ads in a limited number of national magazines and first

use of the "Pepsi-Cola Hits the Spot" jingle in radio broadcasting were in 1939.

And the continued growth of the carbonated soft drink in the American market was in evidence at the World's Fairs in Chicago (1933-4) and New York (1939). The Chicago exhibit included a fully equipped bottling plant, producing 120 bottles per minute. Booths throughout the grounds dispensed Coca-Cola; 30 of them served bottled drinks, 23 the fountain drink. In New York a similar exhibit was made, including a serving counter 150 feet long, in the Food Building. There the huge exhibit was surmounted by a mural depicting the place of the soft drink in America's daily living.

INDUSTRY STATUS

The earlier years of the thirties were difficult but as the business revival progressed, the industry soon regained its former level and surpassed previous records. At the end of the ten-year period its annual production had again practically doubled in volume, approaching the 500,000,000 case mark, and with per capita consumption close to 100 bottles.

Changing economic conditions, and the industry's methods of doing business, nevertheless had its effect upon the number of operating plants. They were increasing in size and productive capacity. The latter half of the ten-year period was typified by a stabilizing of the number of operating plants at about 6,100.



N. R. A. "Blue Eagle"

Appeared in advertisements and other media to indicate user's compliance with industry Code.

18

Operating in Wartime

1940 - 1950

ENTERING THE PERIOD

During the first half of the 1940-1950 decade the bottled soft drink industry faced the multitudinous restrictions and prohibitions of America at war.

The years 1940 and 1941 were good years from the business viewpoint, with substantial sales increases for each year. New brands, such as Grapette, Lucky Club, and Ma's and Frostie old fashioned root beers, made their bid for the national market through franchised bottlers. Business was particularly good in 1941 and the consumer had dollars to spend; sales increased by almost one-third over the previous year. Yet tensions were building; the war in Europe was moving; and material shortages were impending; Pearl Harbor was coming.

CONTROLS AND RATIONING¹

During 1941 the supply of cork, used for crown closures, was the first problem. Problems of paperboard for cartons, and materials for buildings, quickly followed. And then, with Pearl Harbor suffered in early December, restrictions on the supply of sugar were almost immediate.

As America's entry into the War became active during the early months of 1942 virtually everything the bottler used was put under controls and rationing—crowns, bottles, gasoline, tires, trucks, coolers, vending machines—everything. Prices were "frozen"; labor was scarce, and being diverted into the production of war materials.

Sugar, of course, was the key to operation, as the vital and critical material. Rationing of sugar varied from time to time based upon pre-war use, and from 50% to 90% of such use, and its effect upon the industry's operation was extensive. The reduced supply was "stretched" by concentrating production upon the smaller sizes, and this to a degree kept the supply of bottled drinks at a higher level in number of cases produced, than would otherwise have been possible. Less popular flavors were discontinued, too. Soft drinks were in heavy demand for war plants, and at the military training centers; extra rations or ration adjustment were required to meet those situations.

Crowns too, were rationed at a rate based upon previous use. Because of the limited ration, methods of cleansing and reshaping used crows were developed, but not too successfully. More successful was collection of the emptied large tin cans used for restaurant and hotel foods. These were made into crowns for the bottler collecting them.

OTHER WARTIME PROBLEMS

Even before U. S. entry into the war the matter of Federal taxes entered the picture, with the first proposal in April, 1941, that 1¢ per bottle be levied to add to Federal revenues. The proposal was eliminated by the Senate Finance Committee, after having passed the House with the rate set at 1/8¢ per bottle. Similar proposals in 1942 and 1943 were faced, but they made no legislative headway.

It was a time when the exigencies of war threatened the continued existence of civilian industry, and when full cooperation with the emergency programs became a patriotic duty. The industry associations, of course, took a leading part in organizing the bottlers for cooperative effort in the wartime activities. And, in addition, the Government appointed a Soft Drink Industry Advisory Committee, representing all segments of the trade, for consultation and advice on the many wartime problems it was to face during the months ahead.

Participation in metal salvage programs, in Bond drives, and other wartime projects were normal parts of the bottler's contribution to the wartime efforts of his community. It was a long and hectic period, and it was with much rejoicing that Victory in Europe was celebrated on May 8, 1945, with Victory in Japan following on September 2, 1945. But the wartime problems were far from being over.

CONTROLS END AND POST-WAR EXPANSION

During the few months following the Japanese surrender virtually all controls were ended excepting those over prices, and sugar rationing. With the squeeze of rising costs on inflexible pricing levels, the former presented a serious complication which was eased only by the final freeing of prices on October 23, 1946. Extension of the controls of sugar were favored by the industry during the period of transition to a peacetime economy, to avoid threatened dislocations from a potential shortage and the possibility of runaway price. Sugar controls were finally ended on July 28, 1947.

Among the first controls removed during 1945 were many of those relating to plant construction and expansion of producing facilities. Some purchases of equipment were permitted, early in the year, even though none was to be had because manufacturers were engaged in war production; by mid-1945 they were permitted to have more metals for civilian production. Later in the year limitations on the building of new plants were removed, as well as the restrictions on manpower.

With the removal of wartime controls a period of rapid expansion began. As shown in the Appendix, between 1946 and 1949 more than 1,000 new bottling plants were added to the industry's rolls. A sub-

stantial portion of these were relatively small plants, started with limited capital and inadequate equipment; many of them under special official sugar quotas provided for ex-servicemen; and their continued operation was short-lived. Many of the others, however, represented substantial operations which had awaited only the availability of equipment and facilities for entering the industry during the post-war period.

Some few new brands, also, made their appearance. Another of the old fashioned root beers, Mason's, was introduced to the national market late in 1947, and Pepsi-Cola bottlers were being encouraged by their franchise company to add its Evervess club soda as a supplementary item.

AUTOMATIC VENDING²

The immediate post-war years brought with them numerous innovations in the industry's production and distribution facilities. Among the latter, the automatic coin-operated vending machine was brought into prominence during and since the war, especially in industrial plants. While some machines for vending bottled drinks were placed in service in 1937, renewed plans had been in preparation, and as the peace period got under way the automatic vender made its appearances in increasing numbers. Its importance in the distribution of nationally advertised proprietary drinks was given early recognition, and many thousands of the units soon could be found in the nation's retail outlets.

The automatic soft drink vender was not an entirely new development, however. Mechanical units dispensing single flavors, in cups, had appeared in the early twenties. The "Sodamat" machine was one of the earliest; a post-mix machine which mixed the syrup and the carbonated water in the paper cup. By 1936 the cup machine was quite common; 100 were in use in the Chicago area in that year; single flavor machines. The multi-flavor cup machine appeared on the market in 1939.

Automatic venders for bottled drinks soon followed the cup machine. The "Tavernette" model, used in Chicago about 1930 was one of these. Other models, such as the Mills and Vendo units were introduced about 1937, and gained wide popularity, but with the coming of the wartime period, and its severe restrictions, little real progress with the vender was made in the trade until following the war's ending.

In the early post-war period, single-drink venders predominated, but the selective vender containing several types of bottled drinks, came promptly. And, as manufacturing facilities increased, the total of the automatic venders rapidly rose to make them a major means of product distribution in the bottled soft drink field.

By 1952 a total of 600,000 automatic venders for bottled drinks were reported on location, with an estimated annual distribution of 5 billion bottles. In the same year 38,000 cup machines vended 1.2 billion drinks.

In the early post-war period, the coin-operated "post-mix" soft drink vending machine assumed a position of increasing importance. In this type a small carbonator in the unit charges the water, and changeable containers hold the flavored syrups. Mechanism releases the syrup and carbonated water into a paper cup to provide the finished drink. Operation and sanitation difficulties have been limiting factors, but the advantages which some types of outlets see in the post-mix machine, since handling of bottles is not involved, have helped to make it a serious competitor of the bottled product, although the bottle venders have predominated and the competition of the cup machine was one reason for the "pre-mix" vender of the succeeding decade.

INDUSTRY STATUS

At the beginning of the mid-century mark the industry had fully recovered from most of the immediate effects of the wartime restrictions. Consumption of bottled soft drinks, shown by annual production and sales, had again doubled the level at the start of the decade. The 1949 and 1950 levels were in excess of 1 billion cases; annual per capita consumption reached 158 bottles.

In 1949 the number of bottling plants reached the highest level since pre-depression years, with a total slightly in excess of 6,900. However, this total, as previously pointed out, had been inflated by the many small plants favored with special sugar allotments, and with the beginning of the 1950's the decline was consistently rapid, and drastic.



Early Proprietary Bottles

19

Mid-Century Years

1950 - 1957

TIME OF CHANGE

During 1950 almost 250 plants ceased bottling operations and this rate of closings continued each year during the early fifties. A large portion of this number, however, were converted to warehouses to be supplied with products from other bottling plants within trucking distances; usually both plants were under the same ownership. The new plan of operation served to increase production at the main plant as means of reducing per case production costs, and of minimizing operating difficulties. The plants which went out of business entirely, of course, found the difficulties of operation and of increasing costs impossible to contend with—and those problems were many.

During the early years of the new decade the objections of numerous retailers to handling of the returnable bottles were heard as in some previous years, and this served to intensify the efforts of can manufacturers to break into the soft drink field. Bottle manufacturers, quite naturally, pointed to one-trip bottles for soft drinks as an answer. A lengthy period of uncertainty also resulted concerning the likelihood of conversion to cans as another answer to the retailer's complaint.

ONE-TRIP CONTAINERS¹

In 1948 glass manufacturers introduced bottles of lighter weight, but developed to meet pressure and handling requirements of the trade, and which could be sold with the product—the nonreturnable bottle. The one-trip glass bottle for soft drinks was not an entirely new idea, for in their earlier years some of the national shippers had tried them as means of avoiding the return shipment of empties. Canada Dry did that for several years, starting use of the returnable bottle in 1931. Some of the specialty items, such as the dietetic drinks, have found the single tripper well adapted to their distribution needs. And then, of course, there are bottlers who have found the one-trip bottle an advantage in meeting the demands of retailers or consumers in their selling area. On the whole, however, the cost factor, so important to the consumer of bottled soft drinks, has been a deterrent to universal adoption of the nonreturnable bottle.

For somewhat similar reasons, the can as a single-use container for carbonated beverages has had but limited acceptance and use. Cans for the ginger ale of one of the national shippers (Clicquot Club) of the period were tried experimentally in 1936, but found unsuitable, primarily because of leakage. The can did not appear again in the trade until after World War II.

With metal restrictions lifted can manufacturers developed new types of cans and liners specifically for the industry's products; pressure and acidulants were special problems. The cone top, or crown can, has been used to some extent, but the flat-top can predominates. However, as in the case of the nonreturnable bottle, the comparable cost of the can with that of the returnable bottle has limited the use of the can, although with its introduction there were many who put canned soft drinks on the market. As many as 600 brands are reported to have attempted the use of cans for their products.

Cans for soft drinks were introduced in 1953, and during 1954 about 18 million cases of canned soft drinks were produced. This suffered some decline and leveled off at approximately 15 million cases during 1957, with production of the canned product limited to approximately forty brands from widely scattered canning plants.

Early prominence in the field of canned soft drinks was gained by the Super-Coola line of the revived Cantrell & Cochrane. Similarly, the Can-A-Pop line, canned at Sheridan, Wyoming, and Shasta at San Francisco, were offered for western distribution. The Hoffman Beverage Company, of Newark, N. J., affiliated with Pabst, advertised its canned Tap-A-Cola in limited eastern markets, as did Booth's, Frank's, and Bev-Rich of Philadelphia. Some of the larger ginger ale manufacturers, such as Canada Dry, Clicquot Club, and Vernor's found limited uses for the can in their markets. Canning drinks at central plants, and distributing them to bottlers over a wide area for resale has helped to solve some of the problems incident to their use. Some franchised drinks, such as "Nehi," have adopted this procedure. Coca-Cola is reported using cans experimentally at one local distribution point; Gary, Indiana.

The can has been found well suited for the overseas shipment of the finished drinks to U. S. military forces, with whom the soft drink always have been a popular item. Coca-Cola, Pepsi-Cola, Canada Dry, Nehi, and Hires are using cans for that purpose.

THE PRE-MIX VENDER

It was as one possible answer to the competitive threat of the one-trip container, and even more directly to the substantial growth of the "post-mix" vender previously mentioned, that the "pre-mix" vending unit was developed. In it the completed carbonated drink is prepared in the bottling plant, in tanks quite similar to the metal "fountains" of former years. Placed in the vender, connection of the tank with the automatic filling mechanism and cup dispensers makes the mechanical operation a comparatively simple one.

During 1951 Glascock Brothers Manufacturing Company, of Muncie, Indiana, introduced a limited number of this type of vender and the tank containers for the pre-mixed drink, conducting its development and testing with bottlers of Coca-Cola. However, pre-mix venders and equipment were not manufactured in volume until 1954. Its use has grown steadily since that year, accompanied by introduction of the improvements in the product tank filling mechanism and tank washers used in the bottling plant.

The National Automatic Merchandising Association reports that during 1957 the sale of bottled soft drinks through vending machines of all types reached \$430,000,000, with a total of 800,000 machines in use. Soft drinks dispensed by cup machines, according to the same report, were valued at \$120,000,000 through 80,000 vending units.

MORE COMPETITION

The fifties also brought a high degree of competition from canned and bottled beverage syrups, and canned fruit juices and ades. The juices, particularly, entered the field with the newer types of quick-frozen products. Spurred on by the period's big fruit crops, the juice products were successful in getting a high level of consumption replacing to some degree the demands for the fresh fruits, but also offering new competition to the soft drink industry.

Novel pills and powders for making ades and other types of drinks at home also entered the field, including some to produce a flavored carbonated liquid, and at low cost.

In the bottling trade itself, the development of new artificial sweeteners, calcium cyclamate and sodium cyclamate, resulted in a new type of product starting in 1952 and 1953. The sugarless drinks, suitable for diabetics and other dietetic purposes, became a popular item in many areas for its particular purposes, and has continued as a special item.

Early prominence was gained by the brands "No-Cal" of Kirsch's Beverages, Inc., Brooklyn, N. Y., "Diet-Rite" of the Nehi Corporation, and "Cott's" of the Cott Beverage Corp., New Haven. There were dozens of other local brands tried in this new field of the dietetic drink. Annual sales of approximately five million cases have been reported in later years, including 1957.

PROFESSIONAL CRUSADERS

Competitive products were not the only disturbance. The wartime period had provided to crusaders in the field of foods the opportunity they had been waiting for, to oppose and to derogate many of the items consumed primarily for pleasure and enjoyment, including soft drinks. Their efforts in that direction continued with intensity for several years, and were a continuing source of controversy. Much of their attention was directed to products sweetened with sugar, and with the post-war increase in interests of the medical profession in weight control and of the dental profession in caries prevention all the popular sugar items became subjects of their program's attack. It

caused a situation which was complicated by the lack of adequate scientific bases for the attacks on soft drinks, and which could be best countered by industry measures to advertise and publicize the true nature and purposes of its products. An industry program of that nature was successful to a high degree.

As means of doing this, through its national association the industry for several years has directed attention of the medical, dental, nutritional, and teaching professions to the wholesome characteristics of the industry's products, and their healthful values. Carbonation, particularly the feature from which the effervescent soft drink originated, has been stressed for its recognized physiological attributes. A wide selection of national publications in all of those fields have carried the industry's messages.

INDEPENDENT BRANDS HARD HIT

Further changes in the retailing of food products to consumers were typical of the post-war years, with the supermarket type of food products outlet replacing the smaller stores by the thousands. Consumption of bottled soft drinks in the home having increased to 50% or more of the industry's production, with most of that purchased through the food store with other grocery items, the change was promptly reflected in the bottler's distribution functions, and in competitive influences on his business.

The supermarket outlet, for example, tended to stock for sale primarily those bottled soft drink items which were widely known, such as through national advertising, or the products of the major bottler-advertisers in the area. Lesser known brands, and particularly private brands of the smaller bottlers in this way found their outlets were centering in the smaller food stores, and with non-food retailers, with serious effect upon their potential market. One of the results is the smaller number of bottling plants operating each year, and a trend which favors the nationally advertised and franchised brand. The production of one or more of such brands has become a common objective of the bottler.

In mid-century the franchised bottlers of Coca-Cola number more than 1,000. Pepsi-Cola and Seven-Up each are bottled and distributed by more than 500 bottlers, while over 400 bottlers are franchised for the bottling and distribution of the Nehi line, or of Dr. Pepper. Sales territories are, of course, defined in the respective franchises. Many hundreds more have franchises for the sale of products such as Canada Dry, Orange Crush, Hire's Root Beer, Squirt, Nesbitt's, Tru-Ade, and numerous other brands for products in these general categories, a comprehensive list of which appears in the Appendix.

And, of course, numbers of the plants producing the foregoing in particular sales areas are owned and operated by the proprietary company itself, rather than by a franchised bottler.²

COSTS PUSH PRICES UP

The steadily rising costs of labor, materials, and items of capital equipment during the post-war decade also presented severe operating

problems with complications in its earlier stages caused by the wage-price freeze of January, 1951, during the Korean incident. However, this restriction on price changes was revoked late in 1952, and selling price levels have been increased in most areas to keep ahead of climbing costs.

From a prevailing level of 80¢ per case of 24 small bottles existing at the closing of World War II, selling prices have increased sporadically, and by areas, with the obvious influences of local competitive conditions. Common levels, for example, are 96¢, \$1.00, \$1.20, \$1.40, and some higher. Bottled soft drinks are no longer typified by the "nickel" price.

Bottle sizes, also, underwent something of a change. In 1955 use of the twelve-ounce capacity bottle for Coca-Cola was started in some areas; in others the ten-ounce bottle was used, some also added the family-size 26 oz. bottle. Use of the older "split" was continued, so that for the first time many consumers saw Coca-Cola in two or more sizes of bottles.

Other nationally advertised drinks, including Pepsi-Cola, Seven-Up, and Dr. Pepper, also authorized the use of various sizes of bottles in order to encourage new uses, and to get wider distribution. Primarily this meant use of the larger sizes, such as the 12 oz. bottle; in the case of Pepsi-Cola the 8 oz. bottle was added, principally for the vender.

A few others revived use of the 16 oz. bottle. This was a size used quite extensively in the thirties, but which had substantially disappeared from the trade prior to World War II.

STATE TAX PROBLEMS

High Federal and State taxes, common to all business operations, have been serious detriments to the industry's rate of expansion, and intensify the serious operating problems previously mentioned.

In some States the situation has been aggravated by the levying of special sales taxes on soft drinks, with the one cent per bottle tax of South Carolina (enacted in 1925) the common precedent.

Pennsylvania had such a tax from 1947 until its expiration in 1951. A similar tax was enacted in West Virginia in 1951. Proposals for this type of tax have been made in the legislatures of virtually every State, and are a continuing threat to the industry's progress and expansion.

Currently, the one-cent per bottle sales tax is in effect only in South Carolina and West Virginia. Most other States levy license fees of various types and amounts on bottlers operating within their borders.

The soft drink industry's objection to special taxation of its products is not limited to the threat to progress which such a tax represents. With earnings margin limited to a few cents per case, such a tax must be added to the selling price, for a refreshment product which has attraction to the consumer because of its low cost. Higher consumer cost, by reason of a tax, therefore does represent a major basis of the industry's opposition.

In addition, however, the industry grounds its position on the injustice, and the discrimination involved in such a levy. Soft drinks in the Twentieth Century are common items of daily consumption. They are marketed in competition with the many hundreds of other items of food and drink sold to consumers at the corner grocery store and the supermarkets, with particular emphasis on the coffee, tea, cocoa, fruit juices, and the numerous types of drink powders, syrups, and mixes vying with the bottled soft drink for the consumer's favor.

The soft drink bottler looks upon the segregation of his product from all these other food and drink items, for special taxation, as involving the highest degree of unfairness against one of the nation's groups of small businesses.



PART V

*The American Industry in the Twentieth Century
and Its Mechanical Development, 1900 - 1957*

Early Mechanical Developments

A PERIOD OF CHANGE

The Twentieth Century opened an entirely new era for the soda water bottler. With the availability of compressed carbon dioxide in cylinders, the crown cap, the machine-made bottles, and a little later the coming of the auto truck, all of these served to forecast many changes. It was to be an economic revolution for one of America's smallest industries.

And each of these innovations brought others. Introduction of the crown cap by the Crown Cork and Seal Company, for example, was followed by Painter's foot-operated machines for affixing the new closures to the bottles, and for syrumping. Then, just prior to 1900, power-operated crowners were introduced, and the automatic crown feed mechanism dates from that same period.

The new century meant not only new devices and equipment, but new faces, and new firms engaged in the production of facilities for the bottler's use. Virtually all of the manufacturers of bottling plant apparatus so well known in the early 1890's had disappeared by 1920. The Eick and Hamann bottle washing devices were still on sale, but they too were on their way out. Early in 1920 the John Matthews firm was advertising only the "Matthews Soda Water Tank."

The innovations continued to come frequently, and major advances were made by the industry in its mechanical development. Yet the bottling plant did not always keep pace with the ingenuity and inventiveness of the mechanical trades. To large degree this may be attributed to the problems of transition, and there was usually a lag of many years before the older and less efficient equipment was actually replaced by the newer types. Foot-operated syrumpers and crowners were still in use, in hundreds of the smaller plants, well into the twenties.

As the new century opened, therefore, the bottling of soda water was still in a most primitive stage—judged by mid-century standards. This may be illustrated by brief descriptions of two typical plants of the first decade of the 1900's.

THE 1900 BOTTLING PLANT

The Wagner Bottling Works of Venice (and later Granite City), Illinois, is used as the first example. The business was started in 1901

by J. Fred Wagner. It was a small plant typical of that day. The flavoring syrups were prepared in stone crocks, mixed by wooden stirring paddles. When ready, the crock's outlet was connected by a flexible hose, or pipe arrangement, with the syrup valve on the filler.

Liquid carbon dioxide was used; water was carbonated by one of the several newer carbonators introduced during the preceding decade by the Liquid Carbonic Company. In other respects this plant was ahead of many, for it was using the new crown closure, and the new bottle finish it required. Many other bottlers were still using the swing-type stopper, or the "Hutchinson" type.

The filler was a foot-power Crown Cork and Seal machine, the bottles and crowns being hand-fed. Although a second filler of this type was required by 1910, it was not until 1922 that the first automatic filler was used—a "Shields."

Bottles were washed in wooden tubs, by hand; the first automatic power washer was not installed until 1910. Water treatment was simple; for the first few years a stone filter was found adequate for clarification. In 1910 a water still was installed, and the distilled water was used for bottling and for other plant operations.

Flavors were the usual white, black, and red line—meaning lemon, sarsaparilla, and strawberry. Delivery was made by a horse-drawn wagon, to a community of about 15,000, with sales amounting to 12,000 cases the first year. It was not until 1903 that the second team and another wagon were added to the delivery equipment. The first auto truck was used in 1915.

And, about 1910, the first juice drink—orange—was added to the line, as well as a nationally advertised beverage known as "Iron Brew." Principal outlets were the community's pool rooms, restaurants, coffee houses, fishing resorts, and picnics. It was a summertime business.

SECOND EXAMPLE

Compared with the foregoing soda water plant of the smaller community, the facilities of one of the larger and more modern bottling shops of that same period, located in New York City, differed primarily in capacity—the Moxie plant.

This plant was devoted entirely to the bottling of one of the early proprietary drinks. All of the water used was first filtered by sand-gravel, charcoal and International disk filters. The water for product use was then distilled and cooled prior to carbonating. In this instance the liquid carbon dioxide also was used as the cooling medium, as a step in its expansion from liquid to gaseous state; a system designed by Wittemann Brothers.

Two carbonators were used; one of the type sold by S. Twitchell Company, of Philadelphia, and the other by James W. Tufts, of Boston. Twitchell's carbonator called the "Washington," was automatic in action, pumping the gas and water together and spraying the mixture through the gas chamber under pressure to affect the saturation process. The Tufts' carbonator was the "Cataract."

The plant's volume of production is not recorded, but was undoubtedly large, as indicated by its filling equipment. The filling line in the bottling room consisted of ten foot-powered bottling machines of the Crown Cork and Seal Company; crowns were hand-fed. Flavoring syrup was piped from the mixing vat to each of the bottling machines, each of which had its own automatic syrup gauge. Each bottling machine had its operator, of course.

In the bottle washing department all bottles were washed with the filtered water. Following the customary soaking operation, the brushing-rinsing operation was done on an Eick bottle washing machine having sixteen brush and rinsing heads.

Full and empty cases moved through the plant, and to and from the filling line, by one of the early types of gravity operated, roller conveyors.

It will be noted that in both of the examples cited the bottler was using crown cap closures, and the newer type of filler designed for use of the crowns.

AUTOMATICS AND SEMI-AUTOMATICS

At the turn of the century the Crown Cork & Seal Company made advertising capital of the fact that it was producing nine kinds of machinery for bottling plant use. During the first two decades of the century it introduced a new line of automatic and semi-automatic fillers and crowners, power-operated. First two of these, during 1907-1911 were known as the "Senior" and "Junior," with the syringing, filling, crown feed, and crowning being done entirely by the machine, into which the bottles were fed and removed by hand. They represented a new approach to the filling operation.¹

The Senior machine had a line of three separate operating heads, into which the bottles were fed by hand, each head completing the sequence of the syringing, filling, and crowning its bottle. Depending upon the proficiency of the operator, as many as 550 to 600 cases per day could be bottled. The Junior machine, with about half that capacity, had one syrup head and one filling head, such heads being automatically fed in sequence by an intermittently revolving dial of eight bottle pockets into which the bottles were placed by hand. Neither used counter-pressure.

The "Dixie" automatic and the "Baltimore" semi-automatic followed, being developed during 1918-1919 and advertised in a preliminary way, but not manufactured until late in 1920. Both were of the general style of the Junior filler, but on the Baltimore the syringing, filling, and crowning operations were hand-controlled—hence semi-automatic. Its capacity depended upon the operator and it was intended to provide for productive capacity between the foot-power and the automatics.

The Dixie included several innovations, giving it a capacity of 20-30 bottles per minute. One of these was an approach to the use of counterpressure in its closed system by balancing pressure in the

bottle and in the machine's "balance tank." The latter was an intermediate reservoir receiving the carbonated water from the carbonator, and controlling its pressure during the filling operation. And in the Dixie the height of the filling heads was adjustable to suit different sizes of bottles; on the Junior the table level had to be changed to do this. Various models of the Dixie machine found wide use in the industry over a period of several decades.

During the seventeen-years life of the Painter patents on the crown closure and machines for its use, there was almost complete absence of competitive equipment. It was a period of some uncertainty and many bottling plants continued to use the old-style bottling tables and closures, such as the popular "Hutchinson" internal stopper. By 1912, however, conversion to the crown type of closure had been completed to the extent that the "Hutchinson" and similar closures disappeared from the trade, and the crown became the standard. No doubt this was hastened by the fact that Painter's patents had expired, and new machines were coming into the field.

OTHER EARLY FILLERS

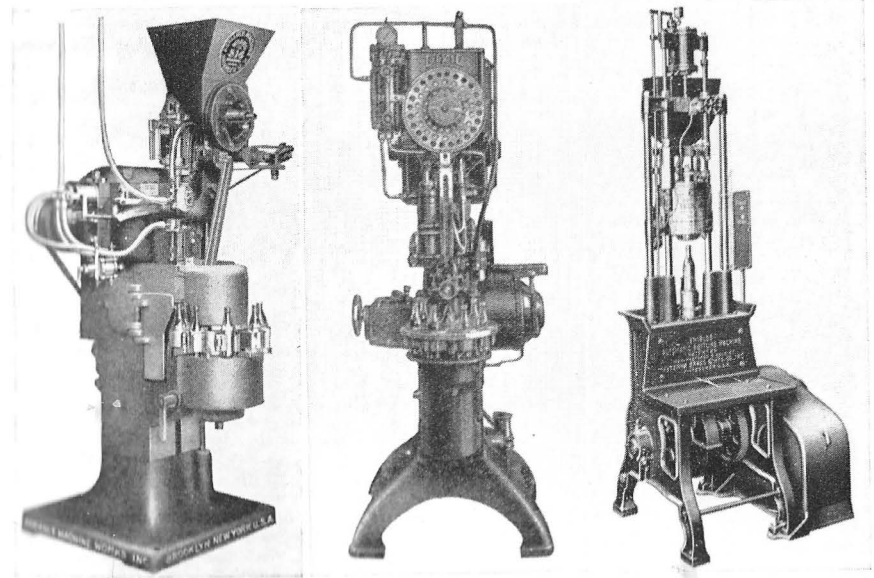
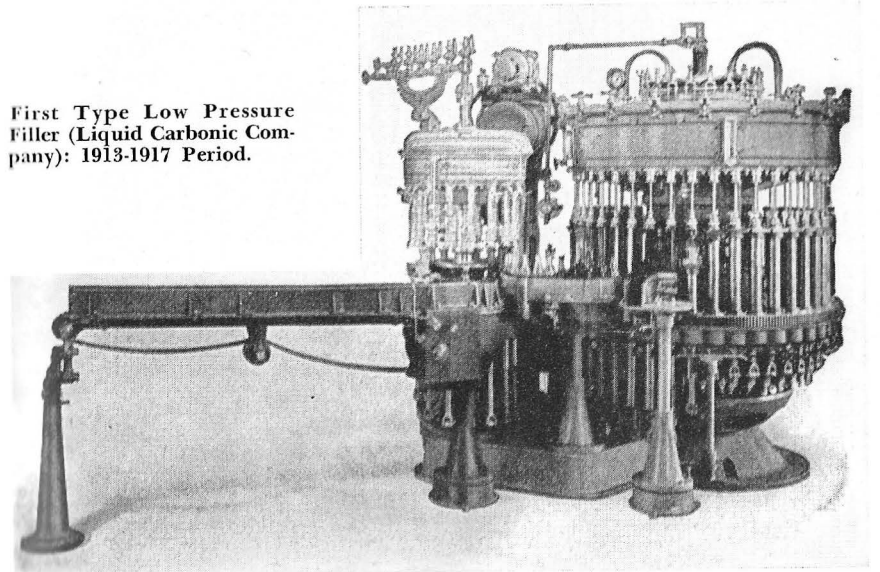
In 1913-1914 the Liquid Carbonic Company put its "Standard Liquid" low pressure rotary syruper and filler on the market, as one of the first of the competing fillers of the new type.

It was an early use of the "low-pressure" principle by which the filling operation was accomplished by means of atmospheric counter-pressure during passage of the bottles through the filler after leaving the syruper; frequently referred to as the "low pressure" system. Passage to the crowner of the filled bottles while open to atmospheric pressure, was another of its features. Early models of the new equipment, which was of the tangential, rotary type, were made with 18 and 32 filling heads, plus syruper. The Liquid 40-spout filler was introduced in 1917-1918. A separate crowning machine was used; in 1923 the Liquid introduced its own 6-head crowner. These items, too, represented the first of the "Liquid" line which were to be prominent in the industry for many years. In the early twenties the crowner was made an integral part of this type filler.

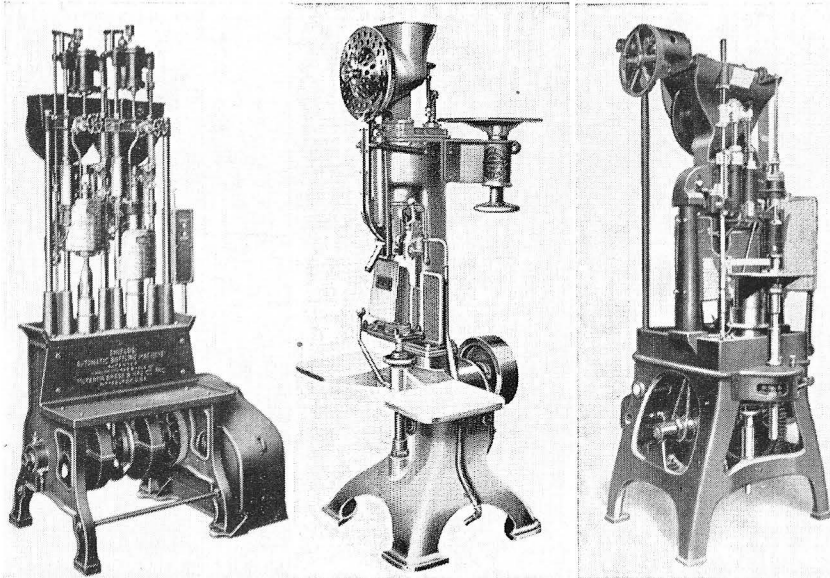
There were others, of course, which acquired varying degrees of popularity during the early twenties. The Shields Automatic Bottling Table Company, of Braddock, Pa. entered the field about 1905 with its line of bottle filling apparatus. Taken over by the McKenna Brass and Manufacturing Company following World War I, a new model of the "Shields" was introduced by the latter about 1920. It was of a type similar to the Senior filler of the Crown Cork and Seal Co.; one model was a single head, another had two heads. A fully automatic Shields rotary was produced later.

The "Adriance" automatic filler was manufactured during the same period by the Adriance Machine Works, Inc., of Brooklyn, which also made a line of crowners. The Adriance filler was quite similar to the Dixie automatic, and was later acquired by the Crown Cork and Seal Company following litigation over patent rights.

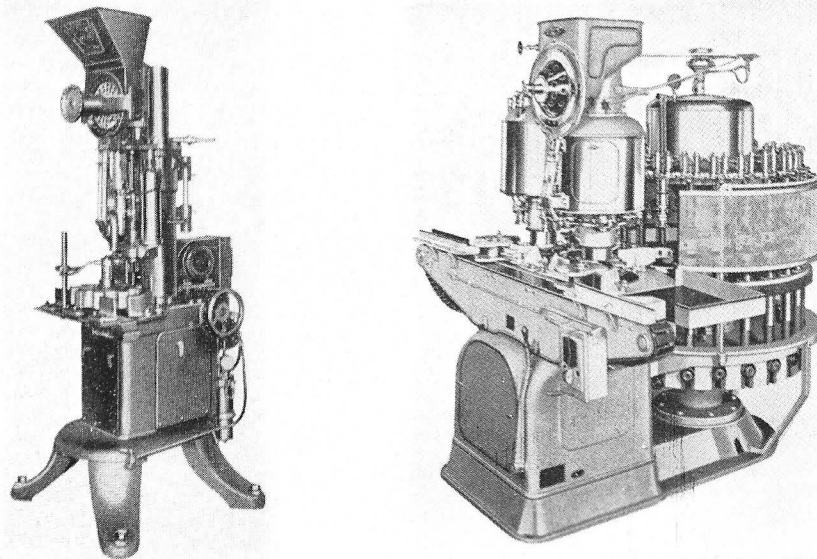
First Type Low Pressure Filler (Liquid Carbonic Company): 1913-1917 Period.



High Pressure Fillers, Models of 1920: Adriance, Dixie, Shields (1-Head).



High Pressure Fillers, Models of 1920: Shields (2-Head); Baltimore Semi-Automatic; Burns Improved Junior.



Fillers, Models of 1930-1935; Calleson (1-Head); Red Diamond (24-Spout).

II. PROGRESS IN BOTTLING EQUIPMENT IN THE 20TH CENTURY

The "Calleson" single-head filler, another filler of the early twenties, was a product of E. C. Bastable Co., Inc., Pittsburgh, Pa., and later of the New Process Cork Company, of Brooklyn. It also resembled the Dixie in its operation, with syruper and one filling-crowning head. Other models of the Calleson were of the rotary type, with four and six syruper heads, plus filling-crowning heads.

Larger units of the rotary type were made for a number of years during the twenties by Bishop & Babcock, of Cleveland. The Burns Bottling Machine Works, Inc. of Baltimore, also was an important factor in the filling machinery field during the first half of the new century with its "Burns" filler, developed especially for the smaller bottling plant. W. L. Burns, the founder, started the business in 1919, advertising the filler as an "Improved Junior." Many improvements patented by him were added in the years which followed.

The "automatic" and "semi-automatic" designations given the fillers and crowners during their early years indicated mechanical progress, but it was not without its problems, principal of which was the manual operation of transferring the bottles from the washer to the bottling machine, and the hand-feeding of them into the filler. If a separate crowner was used, that represented another transfer by hand. In some plants a rinsing-conveyor unit was used to transfer bottles from the washer to the filler, but it, too, involved manual transfer of the bottles at each end.

BOTTLE CONVEYORS IN THE FILLING LINE

Introduction into the filling line of the bottle feed conveyor was a natural result. Early models of bottle conveyors for the fillers-crowners were devised by George J. Meyer in 1912. These were made of canvas belting, but fabric was found unsatisfactory and in 1915 the flat top chain belt was substituted, with the links of either brass or malleable iron. Hard steel was substituted in Crown Cork models of the mid-thirties, and linking standardized.

The chain type of bottle conveyor belt became standard equipment with all manufacturers of bottling plant equipment during the early years of the 1920's, with special units designed to serve as automatic feeders to the filler, carrying the clean bottles from the washer. Early units of this kind were produced by George J. Meyer Manufacturing Co., Miller Manufacturing Company, and the Crown Cork and Seal Company, with accessories continuing the movement of bottles on the conveyor to register them with the dial bottle feed on the filler—an automatic bottle feed. The automatic chain feed quickly superseded the earlier rinsing-conveyor unit.

The bottle conveyor chain was a relatively simple innovation but it was an important one, for it served to eliminate handling of the bottles and to make their movement completely automatic from the time they entered the washer until the end of the filling line was reached. The rotary accumulating table, as an adjunct to the bottle conveyor further aided its effective use. Crown Cork and Seal Company introduced its model in 1926-1927.

The developments previously described all constituted a trend toward the completely automatic filling line from the bottle washing machine to the final accumulating table before case packing.

LATER FILLER MODELS

New models of syringing, filling and crowning equipment during the decades following the twenties tended toward larger and faster machines. Rising labor costs made that more and more essential, and machinery manufacturers became especially active in the production of new equipment to meet that need.

In 1927 the Crown Cork and Seal Company introduced its "Royal" rotary filler, after having acquired the rights to the Adriance and the Simplex line of fillers. In its tangential rotary operation, the Royal comprised a unit of 4 syrupe heads, and 6 combination filling-crowning heads.

This was followed in 1933 by the "Cem" line of fillers, and during the 1933-1940 period the company manufactured Cem machines with capacities ranging from 15 bottles per minute to 300 bottles per minute; with 14, 20, 24, 28, 40 and 50 filling heads. Later, in 1950, to meet the need for greater productive capacity the "Super-Cem" was added; having a capacity of 350 bottles per minute.

MEYER'S "SYNCROMIX"

The George J. Meyer Manufacturing Company, of Cudahy, Wisconsin, had long been identified with the making of bottle washing equipment for the beverage industries when it entered the filling equipment field in 1928 with its purchase of the Henes-Keller filler, previously manufactured by the Henes-Keller Company, Menominee, Michigan.

This was basically an automatic rotary filler, and used for beer; when manufactured by Meyer was renamed the "Meyer Improved Syphon Filler."

However, the Meyer company had been making fillers on order, and in 1924 developed the first combination rotary filler and crowner, for the Waukesha Roxo Company, of Waukesha, Wisconsin.

In 1931 the "Dumore Filcrowner" was added to the Meyer line, being a rotary type, 2-head syrupe, 16 spout filler, and 5-head crowner. Other fillers of larger capacity were also produced during 1934 and 1936, and in 1939 the Meyer "Syncromix" system of filling, described later in connection with carbonation, was introduced.

Used with the 40-spout "Dumore" filler, the "Syncromix" method of filling provided for filling capacities up to 300 bottles per minute. It was a development of a bulk pre-mix system of filling successfully installed by Meyer in 1938 at the Pepsi-Cola plant, Long Island City, the contract calling for installation of 10 complete bottling lines each with a capacity of 200 bottles per minute. The bulk pre-mix had precedent to some degree in the brewing industry, where the beverage was in finished form when it reached the filler. In the early years of

Prohibition some brewers had, in fact, tried to make carbonated drinks in bulk and used their beer fillers for the bottling, but the results had not been satisfactory.

Pre-mix filling was but another start on the climb to higher production to meet the industry's requirements. Meyer and other machinery manufacturers were early to recognize the trend. During the years which followed development of the "Syncromix" system of pre-mix bottle filling, Meyer brought out the line of "Meyer Syncrometric" fillers. Units having 24, 34, 40, 50, and 60 filling heads, plus crowner, were manufactured for bottling plant use; capacity was rated up to 400 bottles per minute.

During the years 1930-1935 the Liquid Carbonic Corporation introduced its line of "Red Diamond" rotary fillers, based upon a combination of the principles of high pressure and low pressure filling. In units having 12, 18, and 24 filling spouts, capacities ranged from 32 to 90 bottles per minute. These included the syrupe and crowning heads as an integral part of the machine.

Later, in 1938-1939, to meet the trend toward faster production, the new "Liquid" line of low-pressure fillers was developed, with units having 18, 24, 32, 40, and 50 filling heads, plus the syrupe and crowner. Highest rated capacity, on the 50 spout, was 200 bottles per minute.

As a later result of this trend, beginning in 1952 Crown Cork and Seal Company, redesigned units of its Cem line of fillers, to provide higher filling capacity. The Red Diamond 12-spout filler was acquired from the Liquid Carbonic Corporation when it retired from the machinery field in 1955, and became one of Cem line. A little later in that year the company introduced its "Cem Uniblend," a new unit for the pre-mix method of bottle filling. With 28, 50, and 60 filling heads, the machines were rated to produce in a range of 200-400 bottles per minute, or better.



Early Proprietary Bottles

21

New Carbonating Procedures

IMPROVED CARBONATORS

Use of the compressed carbonic gas in 1888 brought with it the presentation of new ideas in carbonating equipment. Earliest of these embodied features of the spray carbonator such as that of Scannell (1884), and the continuous method of carbonating embodied in the device of the 1886 Robertson patent, marketed by Witteman Brothers of New York City. And where mechanical action was required, such as for agitation or pumping, pulleys for the application of steam power were being substituted for the hand wheel.

European developments in newer types of carbonating equipment during early years of the 1900's, however, were making use of a combination of the older method of impregnation by agitation of the water and gas, in combination with the newer advantages of the spray, in a type referred to as the cascade form of carbonator.¹ Essentially this involved a spraying of the water and carbon dioxide from the top of a tall cylinder, so that as the spray descended there would be a natural combination of the two. At the bottom of the cylinder the gas and water were collected in another chamber which included revolving paddles, in manner similar to the older carbonators, by which mixture of the gas and water was further increased.

The Liquid Carbonic Company of Chicago entered the carbonating equipment field soon after its introduction of cylinder gas, with carbonators generally embodying the novel combination of spray and paddle features. Among its earlier carbonators there were numerous sizes, including the Geyser (capacity 80 gallons per hour), the Perfection (100 g.p.h.), the Magic (150 g.p.h.), the Excelsior (250 g.p.h.), the Niagara (250 g.p.h.), the Little Giant (300 g.p.h.), and the Columbia with a capacity of 500 gallons per hour. All of these were introduced during the period 1894-1905.

Some of the older manufacturers of carbonators continued to provide competitive equipment. Ferry Manufacturing Company, of New York City, was in the business. Tufts, of Boston, who was a leading factor in the American Soda Fountain Company aggregation, also was typical of these, with his Cataract carbonator. S. Twitchell Company, of Philadelphia, was manufacturing the Washington carbonator, described as an improved English machine. All were power driven. While the two latter did not include the cascade or tower features of the Liquid carbonators, both featured use of the spray method of

combining the gas and water. The President was a later model by Twitchell.

And then, about 1905, Bishop & Babcock, of Cleveland, and Bastian & Blessing, of Chicago, began the manufacture of carbonators as items essential to the operation of the soda fountains they were making. These were used in bottling plants to some extent, particularly the Eureka machine of Bishop & Babcock, later known as Bishop, Babcock, Becker Company.

LIQUID'S NEW CARBONATORS

Beginning in 1906 the Liquid Carbonic Company entered a long period of development of a new line of carbonators. These included the Faultless (1906), the Gem (1907), the Buffalo (1908), the Improved Gem (1910), the Magic Junior (1912), the Magic Giant (1916), the Improved Magic (1919), the Magic Giant (1920), and the Perfection Electric (1927). Virtually all of these, however, included the spray tower and mechanical paddles of the earlier models, but with improvements in these and other features.

In 1930-1931, new models were introduced, most of which eliminated the tower feature of earlier carbonators made by Liquid, and depended primarily upon the mechanical paddle feature to thoroughly mix the gas and water. Models of this type included the new Red Diamond, the Lifetime Magic, the Magic Giant, and the Lifetime Magic Giant. At the same time, another type of carbonator was added, the "DeLuxe Recirculating Carbonator." In the latter, in lieu of mechanical paddles, recirculation of the carbonated water through the carbonator was depended upon to provide the agitation deemed essential to thorough mixture; capacity was rated at 1,000 gallons per hour.

In 1935-1938, carbonator capacities were again increased by redesign, with new models of the Perfection, Red Diamond, Lifetime Magic, Liquid "125," and DeLuxe recirculating carbonator, being manufactured. Capacity of the latter was increased to 1,600 gallons per hour, and a few years later (1946) further modifications increased the rating to 2,000 gallons per hour. In 1955 the Liquid line of carbonators was acquired by the Crown Cork and Seal Company.

Another innovation of this period (1921) was the deaerator, making practical application of an old principle that removal of excess air from water made possible its better carbonation. The DeMarkus Deaerator was one of the first of these novel units, and was made by the McKenna Brass and Manufacturing Co.

OTHER MAKES OF CARBONATORS

Meanwhile, other manufacturers had begun the production of carbonators. During the early years of the twenties, Thomas H. Irwin, of Jersey City, made much progress in popularizing his "Irwin" carbonator, based upon a mechanical system of "spraying agitators," and his device was widely used. In its design he had eliminated the spray-

ing tower of the earlier types. Irwin had been engaged in this field since about 1910.

In 1927 the Crown Cork and Seal Company acquired the Irwin carbonator. The "Nepro" line of "Super-Saturators," or carbonators, was introduced by the company in 1930, and involved a modification of earlier concepts of the carbonation process. In lieu of a spray as means of inducing absorption of the carbon dioxide by the refrigerated water under pressure, exposure of the water was in the form of a film flowing over a vertical series of alternate circular convex-concave plates fixed on a vertical standard, without mechanical agitation. Others used corrugated plates for this same general purpose.

The "Cem" line of saturators, introduced in 1936, superseded the Nepro and also was of the type using the plate series arrangement, with capacities ranging from 250 gallons to 1,000 gallons per hour. Later models were rated as high as 2,000 gallons per hour.

The water to be carbonated, under the older process, also was pre-cooled to aid absorption of the carbon dioxide. In the twenties and early thirties surface water coolers of the pipe and tank types were widely used for that purpose. In 1938 the Liquid Carbonic Corporation introduced a new tower type cooler using Freon as the refrigerant. Further innovation in this field was the combination of the water cooler and the carbonator into a single unit. The Carbo-Cooler, introduced by Mojonnier Brothers Company, of Chicago, in 1937, was of this nature.

As a later development, in 1950 the Kol-Flo Cooler Company, of Bayonne, New Jersey, entered the carbonating equipment field with its "Kol-Flo Supercharged Carbonator," describing its device as a "homogenizing and atomizing method" by which the water and gas are combined under pressure, also without mechanical agitation. A pump forces the water into the carbonating chamber which first breaks up the water into a fog; carbon dioxide is then injected so as to enable the gas to saturate the water, whence it flows into a reservoir under pressure.

PRE-MIX CARBONATING

The process for which the carbonators above outlined were designed was the conventional one, by which water was impregnated with carbon dioxide as a preliminary step. The carbonated water then added by the filler to the syrup, already injected into the bottles by the syring mechanism.

It was a novel departure from this usual practice when, about 1938-1939, the George J. Meyer Mfg. Co. developed the "Syncromix" system, previously referred to, to meet demands for increased filler capacity. This involved a radical departure from the usual carbonating and mixing process. By the new method the syrup and water were first mixed according to formula, and the combination then carbonated to make the finished drink, ready for bottling.

The novel Meyer system was briefly described as follows:

The "Syncromix" method of filling includes the deaerator, where the filtered water is exposed in a tremendous surface to the vacuum. All through this action

the air is being drawn off through the vacuum pump. The deaerated water then goes to the Syncrometer. The Syncrometer automatically delivers the syrup and water at a constant predetermined proportion of mix flowing through a pair of balanced meters, one for syrup and the other for water. From the Syncrometer the mixed beverage is cooled and carbonated and fed directly to the Dumore filler. With this method a blended and carbonated drink is obtained in capacities upward to 300 bottles per minute.

In the development of the Meyer "Syncromix" system the advantages of simultaneous cooling and carbonating the mixed liquid found a ready answer in the "Carbo-Cooler" of Mojonnier, previously mentioned, and it was widely adapted to that purpose.

The "Cem Uniblend," introduced in 1955 and also referred to before, is in this general category of pre-mix filling, using a water meter and a syrup pump for proportioning water and syrup prior to cooling and carbonating. Pre-carbonation occurs in the cooler, which is under pressure, and is followed by the usual carbonating process. The CCS cooling-carbonating unit is called the "Tri-O-Matic."

Later years of the 1940's and early 1950's also brought new models of water cooling units devised to meet the modern conception of the carbonating process and to prevent foaming at high filling speeds. Similar devices for cooling syrups as an aid to the carbonating and bottling process, also were developed, with such units being introduced by Crown Cork and Seal Company, Potter & Rayfield, Inc., Kol-Flo Cooler Company, and others.

SOLID GAS AND CONVERTERS

The use of liquid carbon dioxide in cylinders for carbonation in the manufacture of soda water and artificial mineral waters continued without major incident well into the early decades of the new century. Then the gas was solidified and offered for industrial use in that form.²

The accidental experience of Thilorier in 1835, when some of the gaseous vapor he was liquefying formed snowy flakes, or solidified, seems to have received minor attention until the closing years of the century, and then without widespread result. However, it was in 1897 that a U.S. patent was issued to Dr. Herbert Samuel Elworthy, of the British Army Medical Corps, covering the solidification and use of carbon dioxide.

Dr. Elworthy's interest in solid carbon dioxide is related closely to its use in the making of carbonated waters. While stationed in Bandra, India, he found it almost impossible to obtain a supply of soda for his whiskey-and-soda, so he undertook the making of it. However, he found handling of liquid gas in cylinder to be too burdensome, and hit upon the idea of solidifying the gas to put it in more compact form, thus eliminating transportation of the heavy cylinders in which the liquid was provided.³

First commercial use of the solid gas in the United States was in pellet form, in "carry-home" packages of ice cream, as a refrigerant, and for use with devices invented by Thomas B. Slate, who was connected with the Prest Air Devices Company of Long Island City.⁴ His

interest in the solid gas was primarily for its use in a fire extinguisher, a siphon for making carbonated waters at home, an auto tire pump, and a grease gun, marketed by the company. For such use the solid gas was referred to as "prest air." This was in 1923.

Use of the solid gas in the gadgets of Slate did not bring the business expected. But from interest in that novel form was developed its experimental application to the refrigeration of food undertaken by George C. Cusack, previously connected with General Carbonic Company, one of the suppliers of the liquefied gas. In 1927 the Dry Ice Corporation of America purchased the solid carbon dioxide rights from Prest Air.

Under sponsorship of the new company the use of solid carbon dioxide was first promoted primarily as a refrigerant for ice cream. Beginning 1925 it was sold in the New York City area for that purpose, and later in Philadelphia, Pittsburgh, and Boston, and other metropolitan areas. In 1930 the Liquid Carbonic Corporation actively entered the field, including its acquisition of the General Carbonic Company. Others followed.

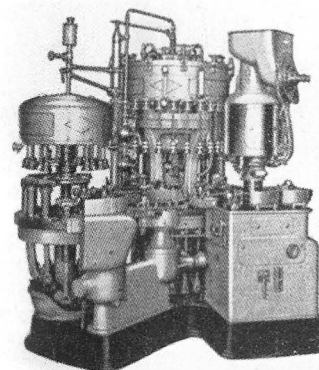
In 1932 equipment was introduced by Rudd Brothers to use the solidified gas for carbonating purposes, in bottling plants. The solid gas was stored in stationary cylinders or converters, where it was allowed to liquefy, prior to its use in the carbonating apparatus in the conventional manner. Dry Ice Corporation provided the solid gas under the trademark "Dry-Ice."⁵ By early 1934 the Pure Carbonic Company had taken over the liquefiers from Rudd Brothers and had acquired the assets of the Dry Ice Corporation, and its key employees.

The devices for converting the solid to gas were steel cylinders of storage capacity ranging from 15 pounds to 150 pounds of the solid gas, which first had to be crushed before it could be put in the cylinder. Later models of the converters engineered and marketed by Pure Carbonic included openings large enough to permit use of unbroken ninety-pound blocks of the solid gas, with cylinders in sizes holding 600 to 2,000 pounds each. Some operate under refrigeration at 300 pounds pressure per square inch, while others operate without refrigeration at about 900 pounds pressure. The same company has designed and marketed a low pressure converter-receiver with 4,000 pounds capacity.

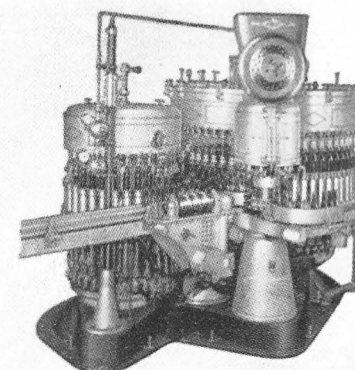
BULK DELIVERY OF LIQUID GAS

In 1939-1940, pressurized storage vehicles for transporting the liquid carbon dioxide at low temperature to user plants were designed as means for supplying those plants not equipped for handling of the solid gas or unable to meet some of the technical problems involved. Provision for in-plant storage of the liquid gas, under refrigeration, as well as means for raising or lowering its temperature as an incident to use, were also necessary. It is commonly referred to as the "bulk liquid" or "low-pressure" system of handling the liquefied gas.

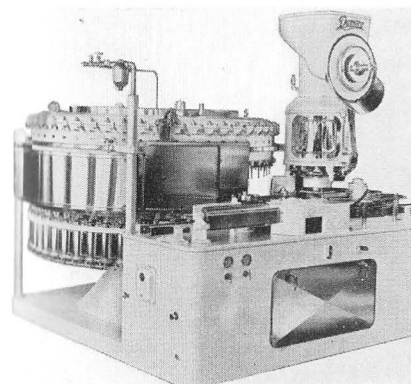
Pioneer in this field was the Cardox Corporation, of Chicago, and later the Pure Carbonic Company and Liquid Carbonic Corporation.



Liquid 24-Spout



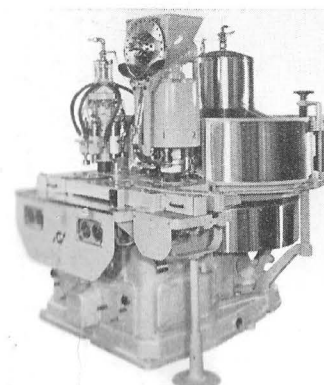
Liquid 60-Spout



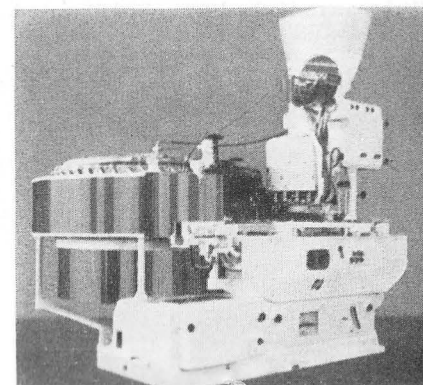
Meyer Dumore



The Carbo-Cooler

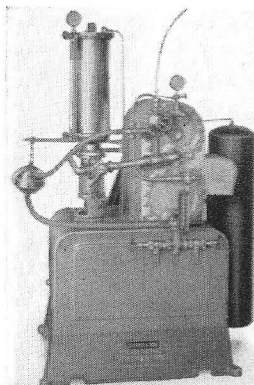
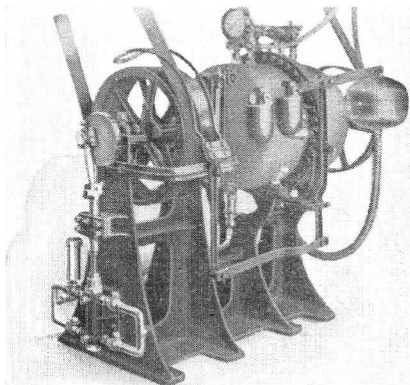


Cem 6-28

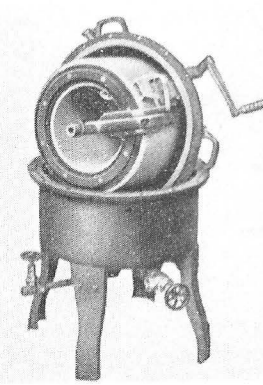
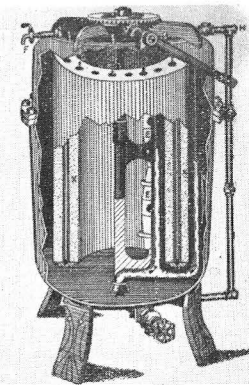
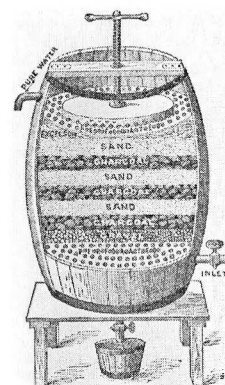


Cem-60 Uni-Blend

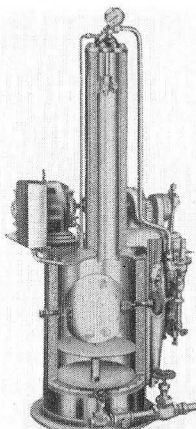
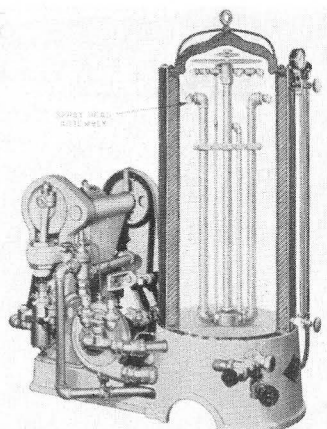
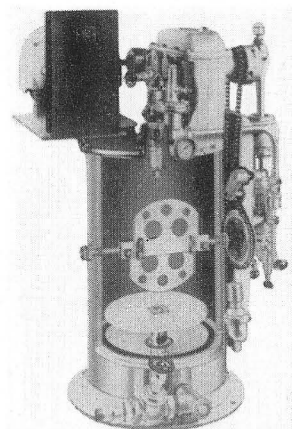
SOME MID-CENTURY BOTTLING EQUIPMENT



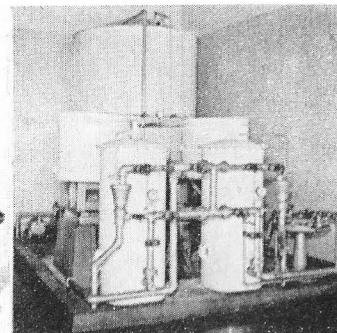
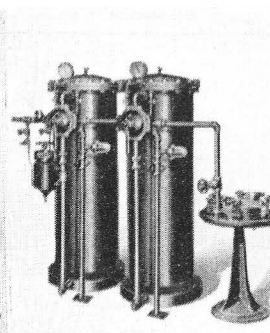
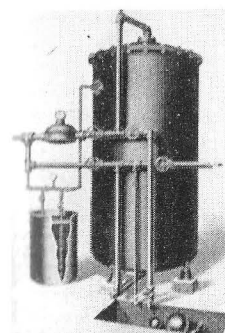
Carbonators (Irwin—1920; Shields Deacrating—1926).



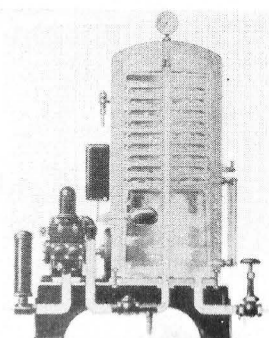
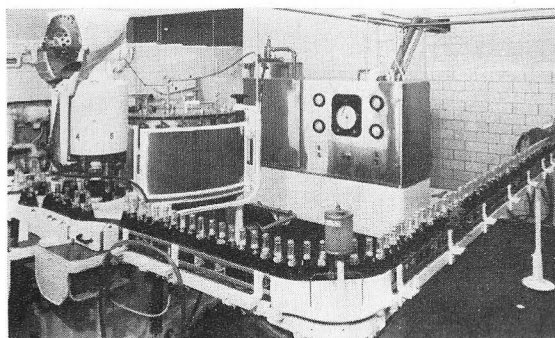
Early Water Filters (Sand Filter—1888; Porcelain Filter; Stone Filter).



Carbonators of the 1950's (Red Diamond, Lifetime Magic, DeLuxe Recirculating).

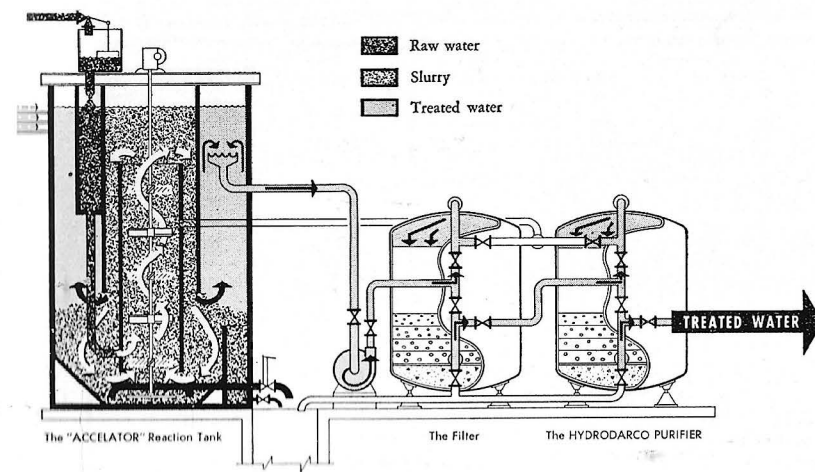


Zeolite Water Softener; Pressure Filter and Purifier; Water Treating Plant.



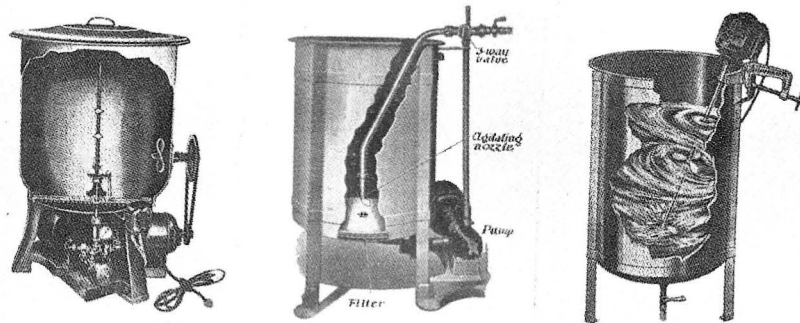
Cem Tri-O-Matic Cooler, Mixer, Carbonator; and Cem Saturator—1950's.

SOME CARBONATORS OF THE 20TH CENTURY PLANT

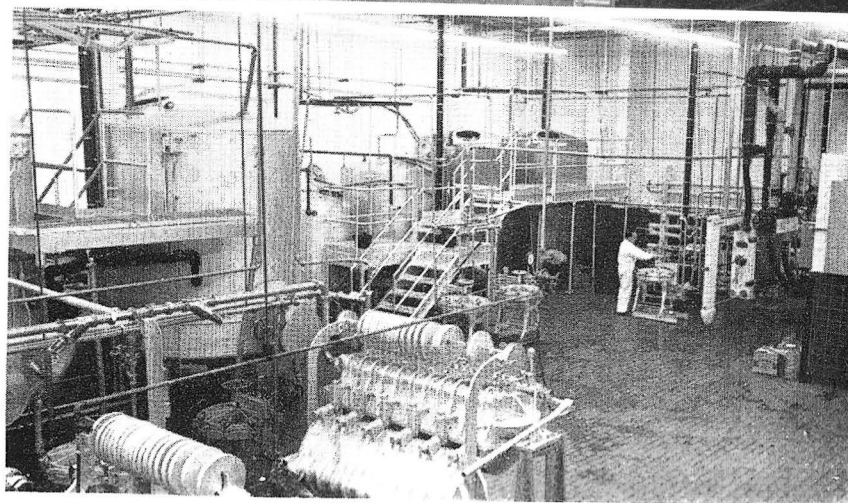
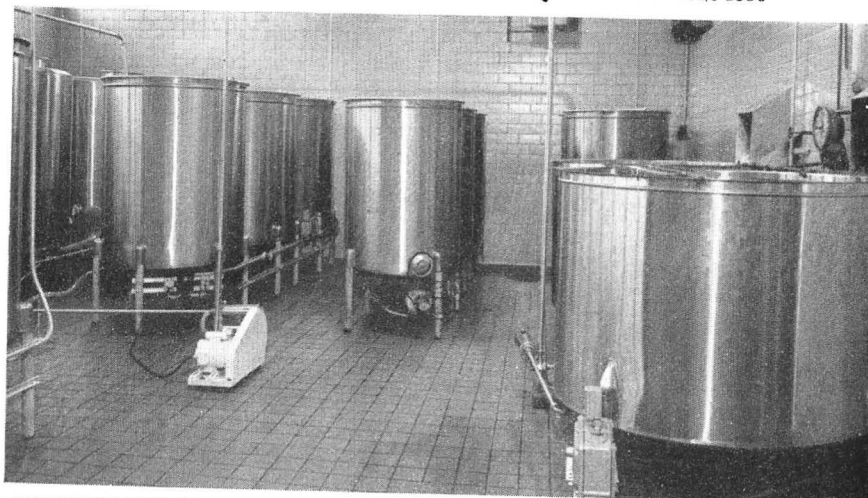


Schematic Plan, Mid-Century Water Treating Plant (Inflico).

SOME WATER TREATING EQUIPMENT USED



INNOVATIONS IN SYRUP-MAKING EQUIPMENT: 1920-1930



SYRUP ROOMS IN THE MODERN PLANT

In 1949 the gas supply method just described was supplemented in some areas by so-called "high-pressure" storage system. Here the liquid gas distributed in bulk is pumped into the plant from the delivery vehicle, to storage in a stationary line of the steel cylinders such as those long used for its delivery from the gas producer. It is then drawn from the cylinders for use in the regular way. National Cylinder Gas Company, of Chicago, and Bev-CO₂, of Elmira, New York, were pioneers of this method.

More recently, in 1957, the Pure Carbonic Company introduced a new type of steel tube each of which will store 2,000 pounds of carbon dioxide under high pressure. This means is designed to avoid the multi-cylinder installations and the multiple pipe connections of the earlier system.



Early Proprietary Bottles

22

Innovations in Bottle Washing

PROGRESS WAS SLOW

The utility of the spindle type bottle brushing mechanisms, such as the "Improved Lightning" bottle washer, is apparent from its continued use well into the earlier years of the 1900's. The small size of the average bottling plant and ample supply of manpower no doubt had much to do with this, but the other types of power-operated brush washers were also making headway.

The Hamann and the Eick brush machines, introduced in the early 1890's were widely used during the earlier years of the new century, and were found in the larger plants, yet both of them soon disappeared from the trade. Rights to the Eick machine were taken over by the George J. Meyer Manufacturing Co. in 1924.

This disappearance of the earlier models of brush machines, used for separately cleansing the bottles after the preliminary soaking, can be attributed to the rapid progress being made in the manufacture of more adequate bottling cleaning equipment, with the unitary combination of all phases of that operation as the ultimate result.

Bottle soakers, automatic to a degree and of British origin, had appeared during the 1886-1888 period, such as the "Triumph" and the "Wilson's Patent." Neither of these made much progress in the soda water plant of those years.

NEW STYLES IN WASHERS

The activity of Henry Scarborough in providing equipment for the bottling plants of soda water bottlers was as early as 1893, when he represented the Philadelphia firm of Charles Lippincott & Co., at Chicago, at the time of World's Fair Columbian Exposition. Later, about 1900, his Twentieth Century Machinery Company was specializing in the "Volz" bottle soakers and washers, built by Logeman Brothers, of Milwaukee.

During his employment by Logeman Brothers, as foreman, George J. Meyer (1871-1945) designed and patented a bottle washing attachment which could be put at the end of the Volz soaker, and about 1904 began its manufacture. With the Scarborough organization as selling agents, Meyer also made a small soaker, known as the "Simplex," first models of wood, and later of steel. A two-compartment Simplex was introduced in 1909; three compartments in 1910. They

were the first beginnings of many decades of activity by Meyer in the bottle washing equipment field as the George J. Meyer Machinery Company, later the George J. Meyer Manufacturing Company.

Another of the early manufacturers of bottle washing equipment of the newer types developed after the turn of the century was Barry-Wehmiller Machinery Company, of St. Louis. In 1901 they had developed the first continuous in-bottle pasteurizer for beer, and as early as 1902 were constructing 2, 3, and 4 compartment bottle soakers for use by bottlers and brewers. A slat type bottle conveyor was developed in 1907, and in 1908 the line was expanded to include a single compartment soaker to serve the needs of the small bottling plant. About 1912 Barry-Wehmiller developed one of the earliest types of bottle inspecting device—bottles were laid on a slotted tray; illumination below permitted pre-inspection before the bottles were mechanically loaded into the soaker pockets.

The Loew Filter Company, of Cleveland, later known as the Loew Manufacturing Company, was active in the field during this early period, also, with its "Cleveland" compartmented soakers introduced in 1900.

Early soakers of these types deposited the soaked bottles either in a water filled rinsing pan or, by 1907, on an outside brushing table where they were automatically conveyed through an outside brushing device, an early model of which was developed by Loew in 1903. Meyer's device previously referred to, and known as the "Simplex Brush Conveyor," was another of that type.

In 1911 the "Loew Hydro Bottle Cleaner" was introduced, with an auxiliary inside brush mechanism. Later this was augmented by another combination machine utilizing dormant soaking, followed by automatic brush rinsing with a muriatic acid solution prior to outside and inside brushing.

The Ladewig & Stock Company of Milwaukee, also were of this early period, as makers of the "Ladewig" bottle washers. By 1910 they were building the "Ladewig & Stock Hydro Pneumatic Bottle Washers." One of their popular equipment items was the "2 cup rinser and conveyor," to rinse and distribute bottles from the soaker to the filler, neck down for drainage; lengths up to 8 feet provided for any number of fillers. Similar units also were made by other manufacturers (Miller, Meyer, Yundt), until it was superseded by the chain type of conveyor and automatic-feed. The firm later became Ladewig and Soelch, which was absorbed by the Heil Company in 1934.

In the "hydro" equipment mentioned above, inside cleansing of the bottles was done by means of a water jet, under pressure, sometimes referred to as "air-brushing," or as the hydro type. It was an early distinction from the inside brush cleaning, although both types some times used brushes for cleaning the outer surface of the bottles in the final stages of the washing process.

Another of the novel developments of this early period was a two-compartment crate and bottle soaker, advertised by E. Goldman &

Company, of Chicago. The crate, and bottles, as received from the trade, were subjected to the soaking process, in the machine, as a unit.

SOME MEYER INNOVATIONS¹

Meyer designed many more innovations in bottle washing machinery during those early years. As early as 1907 he had developed an automatic loading device to feed bottles into the soaker. Previously the bottles had been fed into the washer pockets by hand. By 1913 the automatic bottle loader had become standard equipment on Meyer's "Progressive" washers, and in 1914 the automatic unloader was added. It was during that same period he also designed the bottle conveyor feed for the filling and crowning equipment then in use, previously referred to.

The need for increasing bottling plant capacity soon made necessary further changes in equipment; and the larger type of bottle soaker was one result. In 1910, for example, the first of the larger soakers—a combination of single and two compartment units into a machine of 6 compartments—was installed by Meyer in Seeley's bottling plant, in New York, one of the country's larger plants of that time. This machine provided for a 30-minute soak, and had a capacity of 3,000 bottles per hour.

The combination by machinery manufacturers, of the bottle soaker and the bottle washing mechanism into a unitary machine soon followed; previously the soaker and brushing units had been separate.

In 1914 Meyer manufactured a five-compartment soaker, with brushing mechanism as part of the unit, for the Yuncker Bottling Company, of Indianapolis; claimed as the first American machine of this type. The automatic load and unload became a feature of this type, also.

It was during the years 1916-1918 that Meyer also developed and introduced the single-end bottle washer, designed as a one-operator machine to meet the requirements of the smaller bottling plant. Automatic load and unload was at the front-end of the machine. Prior units usually required two men due to the front end feed and rear-end discharge. The new machine became known as the "Dumore Junior," the trademark "Dumore" having been adopted by the George J. Meyer Manufacturing Co. in 1919 for its general line of bottle washing equipment.

Sizes and capacities of bottle washers, of course, have necessarily increased to keep pace with the needs of the modern bottling plant. Bottle washing equipment of 1957, for example, included machines of 3 to 7 soaking compartments, 8 to 40 bottles wide, with washing capacities up to 500 bottles per minute.

OTHER TYPES OF WASHERS

Meanwhile, other manufacturers had entered the bottle washing equipment field, including the Miller Manufacturing Company, of Bainbridge, Georgia; later known as the Miller Hydro Company. First featuring a hydro-type bottle rinser and conveyor, the company

started manufacturing the "Miller-Hydro" bottle cleaner (rinser, soaker, conveyor) in 1913. First units were of the semi-automatic type. In 1922 the unit was made fully automatic.

Other types of Miller bottle washing equipment were introduced in 1920-1921, including the Miller-Hydro Junior bottle cleaner, and the Miller-Hydro label remover. More recent innovations include the model "400" of 1954, of ultra-modern design, 40 bottles wide, and rated up to 600 bottles per minute capacity.

In 1923 the Liquid Carbonic Company extended its line of bottler's machinery to include bottle washing equipment. The "Liquid" hydro soaker-washer was the first, in 1923. This was followed by the double-end "Super-Kleen" washer of 1928, and by the "Universal" hydro-washer of 1939-1940, the latter being designed primarily for the small plant. Some brush washers also were manufactured. Also, in 1927 the Loew washing machine line was taken over by Liquid and added to its equipment items produced for the bottling plant.

The "Hydro-Jet Superkleen" washer, introduced by the Liquid Carbonic Corporation in 1952 was its last model, developed to meet a growing preference for the brushless type of washer. The company retired from the machinery business in 1955, with its Liquid-Loew line of bottle washing equipment being taken over by Barry-Wehmiller Machinery Company of St. Louis, manufacturers of the Supernational (1932), Viking (1940), and International (1948) bottle washers.

In the twenties the Ladewig & Stock washers were being manufactured, by the Ladewig Company, of Waukesha, Wisconsin, which later combined with the Creamery Package Manufacturing Company (1925). The Twentieth Century Machinery Company, of Milwaukee, too, was still in the field. And for many years another one of the major manufacturers of the hydro type washers, advertised as the "air brush," was the Michael Yundt Company, also of Milwaukee. Starting in 1916 Yundt made a wide variety of bottle soakers and washers, advertised as "combination soaker-air washers;" early models were designed for the very small bottling plant, and later models for the country's largest bottling plants. The company ceased operation following the death of Michael Yundt, 1942. Shortly thereafter the Yundt line was taken over by the Yundt-Bottlematic Corporation, of Cincinnati, in 1954.

Others included the Dostal & Lowey Hydro Company, of Milwaukee, with the hydro type of washers. Its units, built in capacities ranging from 30 to 180 cases per hour, found popularity with the smaller bottlers. On the other hand, the Heil Company, also of Milwaukee, produced the larger soaker-washer units. Its line was transferred to the Cherry-Burrell Corporation, of Chicago and Cedar Rapids, in the early post-war period, and added to the latter's line of bottle washing equipment.

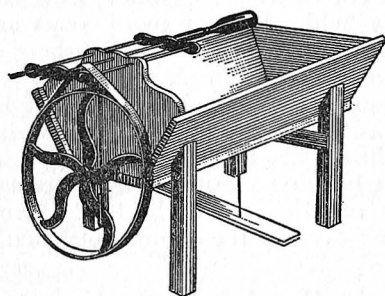
In 1947 the Archie Ladewig Company, Waukesha, Wisconsin, introduced a simplified type of double end soaker-washer, hydro-type, with a single soaking compartment featuring a long continuous soak at

high temperature as a more effective sterilizing process. The unit also was the first to feature an "accumulative unscrambler type load" as an integral part of the machine.

The trend toward the hydro-type of mechanism for bottle cleaning, which may be noted from the foregoing outline of developments in that field during the past several years, has been aided by improvements in washing compounds, additives and wetting agents which increase the effectiveness of the cleansing operation.

Accompanying this has been increased attention to simplifying the equipment for maintenance purposes, in view of the speed required for higher capacities, and the increasing costs of modern bottling plant operation. The bottles themselves are one focal point of this, in order that they may be fully protected against damage in the washing process. Added protection is given by treating the bottles with a semi-permanent surface coating, such as of silicones, a process developed at the Brockway Glass Company and used generally by the bottle manufacturers.

There have been many others, producing bottle-washing equipment, including a number of manufacturers specializing in the smaller types designed for the small and medium-sized bottling plants. Among these may be listed such machines as the Rapid, Sturdy-Bilt, Economy, and the Niagara. The Union Engineering Company and McKenna Brass & Manufacturing Company were in this field, also.



Goulding's Bottle Washer—1880's

23

Water Treatment and Syrup Preparation

THE WATER PROBLEM

Suitable water for beverage manufacture always has been of prime importance, but early efforts of the soda water bottler to provide the best water for his product were subject to lack of adequate equipment which he, as a layman, could use to advantage.

In Sulz's *Treatise on Beverages* (1888), the providing of water of proper purity, clarity, and chemical constituency, was recognized as one of the prime objectives of the soda water bottler. Matters of color, taste, and smell, and their various chemical and bacteriological problems were discussed in some detail for more than 100 pages. Special emphasis was given to distillation, filtration, coagulation, and chemical treatment as means of securing a potable product. Also, the effectiveness of carbonation as a destroyer of some organisms was pointed out, as well as the importance of aeration in the process of treatment to supply the deficiency of oxygen existing in many water supplies. Treatment of water with lime to reduce alkalinity, and with alum for clarification, also were among these early methods of water treatment.

Patented mechanical filters using sand, charcoal, and sponges, as the filtering media, as well as disk filters of cotton, asbestos, and paper, were being used at that early time, but to a nominal degree. The stone or porcelain type filter was, by far, the device most commonly used for water clarification, and in most instances the bottler found this type of mechanical filter was quite adequate for the removal of suspended matter, which was his biggest problem.

In some instances, where suspended matter was particularly serious, clogging of the stone type filter presented a problem, requiring further treatment by a quartz filter, and frequently a disk filter was added as a third and final step. The International Filter Company, of Chicago, was in the field with the quartz filter and disk type during the early 1900's.

Although some of the larger plants made effective use of distillation to provide water of the highest purity for their products, that process was not in wide use in the smaller plants, which predominated. Sand filters were used to some degree, but the use of stone filters was by far the most popular water treatment. While the use of this type was subject to the inherent difficulty of keeping it from becoming clogged,

and thus assuring its effectiveness, the introduction of major innovations generally did not occur until well into the 1920's.

Increasing use of chlorine in the treatment of municipal water supplies, and the problems chlorine presented in relation to taste and to its effect on colors, were reasons, about 1929-30, for the introduction of improvements in the activated carbon filtering device, such as the "Hydrodarco" filter of the International Filter Co.

LIME-ALUM AND TREATING METHODS

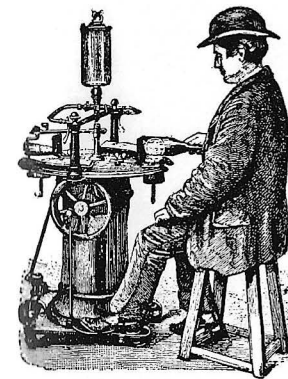
It was during the early years of the twenties, also, that the continuous method of treating water with lime, alum and chlorine was introduced as a substitute for the batch method, which had been used for many years in the beverage industry. This continuous treating plant was suitable only for use on waters high in alkalinity. Equipment provided for that purpose included the system of the International Filter Company of Chicago (Infilco, Inc.), and in later years that of the Western Filter Company, Potter & Rayfield Company, and the Permutit Company.

In 1927 a coagulant-chlorinating system using alum-aluminate and chlorine was devised for treating waters low in alkalinity and discolored mineral matter. Its purpose was the removal of objectionable organic matter, turbidity, iron, manganese, color, taste and odor.

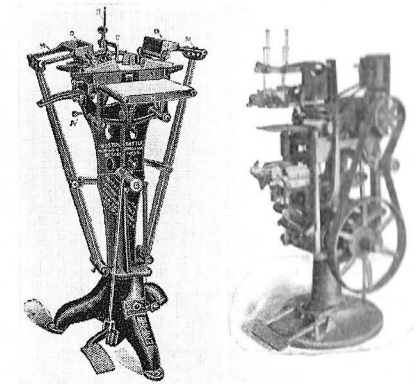
Beginning about 1940, the continuous lime treating system, and the coagulant-chlorinating system were combined into one unit, with improvement in results and reduction in the size of the equipment. In later units of this type, about 1946, ferrous sulphate was substituted for alum, for the better coagulation it provided on both low and high alkalinity waters. Thus one type of treating unit could be used for alkalinity reduction, or for the purposes of the older coagulant-chlorinating system, or both.

Meanwhile, beginning about 1937, equipment for the control and reduction of alkalinity by the hydrogen-ion exchange method was introduced as a possible substitute for the older lime treatment. The new method involved passing the water through a bed of acid-regenerated zeolite mineral (cation exchanger) which replaced hydrogen for the calcium, magnesium and sodium. While having its advantages, the system was found to present difficulties because it did not make provision for removal of organic matter. This, and other technical complications in its operation, were reasons for a decline in its use.

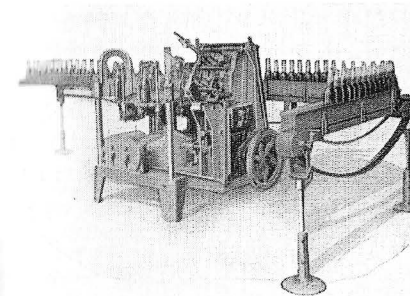
Other means and methods of treating water for beverage manufacture were popular during the same period. Chlorine, and the ultraviolet ray, had a wide use for the elimination of bacterial contamination, but due to their limitations have been largely superseded. The ozone water sterilizer was another in this category, serving to replace chlorine for its bactericidal effect, and for the destruction of taste and odor in water. Harry B. Hartman, of the Norwood Filtration Company, took a leading part in the development of the ozone water treating method, having over one hundred patents issued to him.



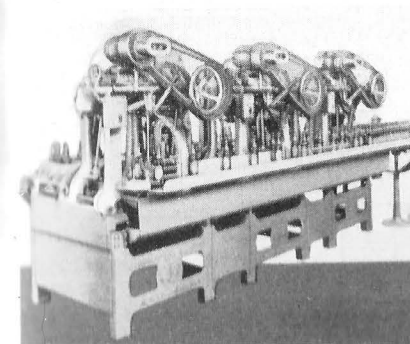
Early Labeling Machine—1880's.



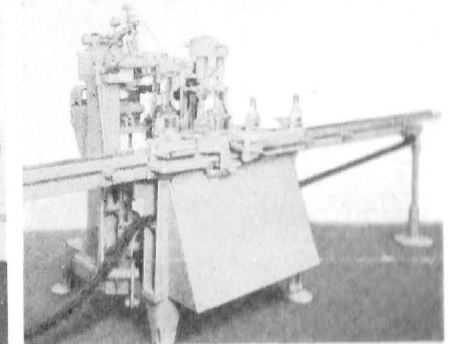
Empire Labeler, World Labeler—1920.

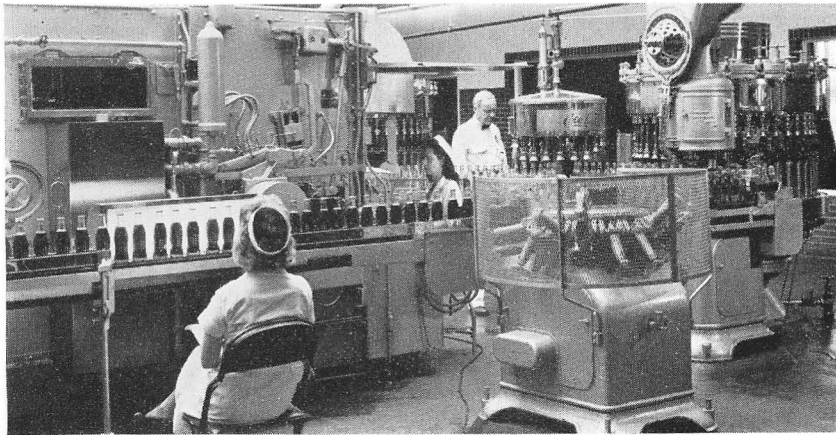


Automatic O & J Labeler, World Automatic Rotary Labeler—1920.

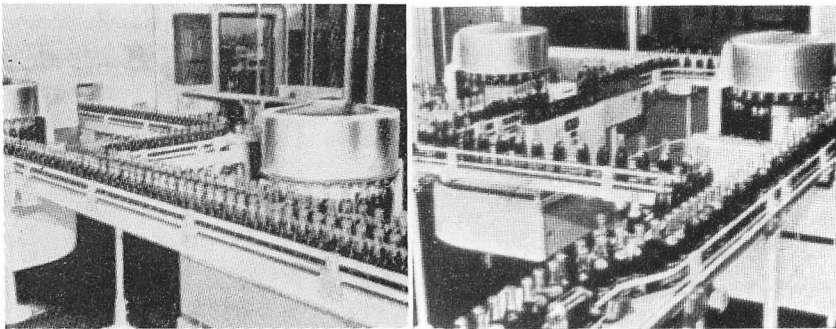


World Tandem Labeler, Standard-Knapp Rotary Labeler—1957.

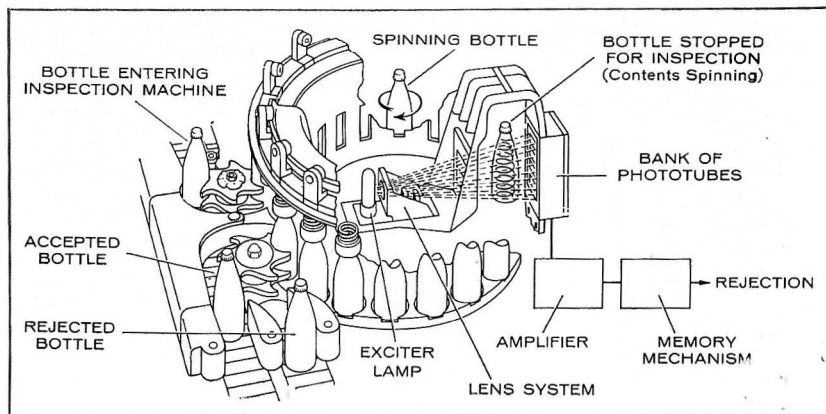




Visual Inspection of Product.



RCA Automatic Beverage Inspection Units in Use.



Schematic Plan of RCA Inspection Unit.

PRODUCT INSPECTION ON THE FILLING LINE

Electric Water Sterilizer and Ozone Company, of Scottdale, Pa., was early in that field (1920).

Suitable water for bottle washing, also, is important for proper mechanical maintenance. The zeolite water softener, which originated in Germany around 1905, was introduced into this country some years later by the Permutit Company (now Pfaudler-Permutit, Inc.). Due to its effectiveness in softening water so that it would not form sludge or scale on equipment, the zeolite water softener found early use in treatment of water for bottle washing as well as feed water for the steam boilers.

SYRUP ROOM IMPROVEMENTS

The syrup room of the soft drink bottling plant of the 1950's, with its tiled floor and walls, its gleaming covered syrup tanks, and its fluorescent lighting, is one of the best indicators of the industry's progress in sanitation and cleanliness since the turn of the century.

In the later years of the 1800's, and during the first two decades of the new century, syrup-making facilities of the average plant were quite simple, an overhead syrup crock connected with the filling machine by flexible hose was typical. In some plants the syrup container was on the second floor above the filler; in others on a small raised platform or balcony. In virtually all cases sugar was dumped from the bag in which received into the crock, and the right amount of water and flavoring extract added, according to formula. Mixing was then a hand operation; usually with a wooden paddle.

Later the mixing labor was eliminated somewhat by the portable electric mixers. This was a motor operated shaft with blades attached, suspended in the syrup tank or crock. Electric mixers were introduced about 1920. During the early years of the 1920's several models of this device made their appearance, some as a fixed part of the syrup tank unit. Alsop Engineering Corporation of Milldale, Connecticut, and the Pfaudler Company, of Rochester, New York, were principal pioneers in the introduction of these desirable innovations. Syrup filters and pumps came into general use.

During this same period of the early twenties the growing production of the industry's plants brought with it the need for syrup mixing containers and storage receptacles of greater capacity. To overcome the natural problems caused by chemical reaction of the acidulated flavoring syrups on available metals, the glass-lined metal tanks ("glassed steel") were found fully satisfactory, and their manufacture and introduction into the trade followed. This was in 1919-1920. Glascote, and the Elyria Enameled Products Company, were early in this field.

In this same category, the stainless steel syrup tank represented another advance. Stainless steel made its appearance on the market in 1909, but it was not until the 1930's that its fabrication into syrup tanks for bottling plant use became at all common, and particularly after the A.B.C.B. Fellowship Report on the "Suitability of Materials

used for Syrup and Carbonation Equipment" (1932). Their development and use from that time forward was rapid.

SANITATION MEASURES PROMOTED

The spoilage problems connected with the compounding of flavoring syrups in the bottling plant were early subjects of study at the research Fellowship established in 1923 by the American Bottlers of Carbonated Beverages at Iowa State College, Ames, Iowa. Sources of contamination were found to be frequently connected with the sanitary qualities of the sugar and water used, and the conditions of such use in the bottling plant.

The advantages of the hot process of mixing and compounding the syrups, in closed containers, was one of the first recommendations. It was widely and successfully used in the industry during the succeeding years, but later declined with the advent of more modern equipment and processes. Other sanitary measures of mixing and conveying the syrups, and of storing the sugar prior to use, also were helpful.

For this greater interest and progress in these important sanitary aspects of bottling plant operation, much credit is due the association for attention given to that problem at its Fellowship over a period of many years. The Fellowship at Ames was in charge of Professor John H. Buchanan, of the Department of Chemistry and Dr. Max Levine, of the Department of Bacteriology, both contributing much to its successful and effective work.

One of the important results of this attention to sanitation in syrup preparation, and in the other technical aspects of bottling plant operation, was the preparation of the A.B.C.B. Sanitary Code for bottling plant operation. Compiled with the assistance of the Fellowship, and thoroughly considered and evaluated by association representatives actively engaged in the industry, it was published by the association in 1929 for the voluntary guidance of the industry toward higher standards of plant sanitation, particularly in its relation to syrup making.

This, and the numerous other papers and reports on sugar handling and syrup making which emanated from the technical studies of the Fellowship at Iowa State College, and which were published by the association and by the trade press, did much to encourage greater attention to the sanitary aspects of the industry's operations, and to assure the consumer of products of the highest quality.

LIQUID SUGAR

The problem of using dry sugar in syrup making, was not limited only to its sanitary aspects, despite the importance of this in the avoidance of contamination. There was the burden of its handling and storage in the plant.

Liquid sugar, to be transported in tank trucks the same as other liquids, and piped into sanitary storage tanks in the plant was early

recognized as one answer. Experiments with the making of liquid sugar, and the use of it in industry, were started on an experimental basis in 1925, in New York City. In 1927 the first plant for its commercial manufacture was opened in Brooklyn, by Refined Syrups & Sugars, Inc. However, hampered by the problems of the depression years of the 1930's, and the World War II years, progress in its industrial uses was slow.¹ The Pepsi-Cola bottling plant in Long Island City was one of the earliest users of liquid sugar in making bottled soft drinks.

In the post World War II period, beginning in 1945, the manufacture and distribution of high quality liquid sugar by the refineries was greatly increased, and its use in the bottled soft drink industry made necessary some further modification of the bottler's syrup-making facilities. Particularly, there was need for in-plant storage tanks and adequate prevention of contamination. Stainless steel and glassed steel tanks were found well adapted to storage of the flavored, acidulated syrups.

And by mid-century the stainless steel and the glassed steel syrup tanks had become normal equipment items in the syrup room of the soft drink bottling plant. Pipe lines for conveying the syrup to the filler also are of stainless steel, glass, or other material designed to allow thorough cleansing.

Over 125,000 tons of sugar in this liquid form was used in the manufacture of bottled soft drinks annually in the early years of the 1950's, in 1956 it was 325,000 tons. Bottled soft drinks became the biggest user of liquid sugar.

SYRUP COOLERS

Many improvements in syrup filters have been introduced, also, and other supplemental items such as the syrup cooler, early models of which were introduced about 1936. High speed fillers were found to bring operating problems when the cold carbonated water was mixed in the bottle with the syrup at room temperature. Serious foaming occurred, and loss of carbonation, with resulting effect on product quality. Cooling of the syrup prior to its delivery to the filler, however, served to eliminate this.

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Other Mechanical Developments

THE LABELING OPERATION

Identification of the bottles used by the soda water manufacturer, by the molding of his name on them, began with the earliest use of molds for blowing bottles. Then, as the bottled products gained in popularity and in use, the paper label was added as "dress" for the package, to identify the drink and its manufacturer.

Even as the twentieth century opened, use of the paper label on bottled soda water was limited to the more popular items and were applied to a large degree by hand. It was a simple operation, as shown by this statement of an old-timer:

I recall that my entrance into the industry was in 1907 when it was my job to use a flour paste which, by means of a brush was applied to a wide five-foot long board on which the labels were placed after they were bent to a convenient shape for handling. From this board they were then placed on each bottle by hand.

Some types of labeling devices were available during the closing years of the 1800's, and during the early years of the 1900's, but they were of restricted usefulness, for they supplemented the hand operation in a meager way. Such a device, made in the 1890's by Barnett and Foster, of London, for a combination hand and foot operation, has been described as follows:

The labels, as received from the printer, are put into the label-holder or well—say 500 at a time—and are pressed up by a spiral spring; the pasting roller travels round by the action of the treadle from the foot, it passes over a pad of flannel and then over the label, carrying just sufficient gum or paste to make it stick. The bottle is then pressed (by hand) when the label will adhere to it, its position being always the same equal height from the bottom as it has a regulator for this purpose. The paste is in a glass receptacle above, and is fed automatically, that is, each time the pasting roller comes round, it touches the small supply-cock, and gives just sufficient paste for the size label, so that waste is prevented, and a cleaner label is the result. The apparatus is exceedingly simple, and with ordinary care cannot get out of order.

The machine described is said to have had a capacity of 100 dozen bottles per hour, with the single operator. With two persons operating it, the production could be doubled, it was advertised.

POPULAR MODELS OF LABELERS

When used in the bottling plant during the first decade of the new century, labeling devices were still hand fed, although some improvements had been made on the simple mechanism of the older units, such as that of Barnett and Foster.

The Boston Bottle Wiring and Labeling Company, for instance, had its "Empire" foot-power labeler on the market. Other popular models of the time were the "Y & E" labeler, made by the Modern Machinery Company, of Wilmington, Delaware, and the "Bluebird" machine (hand feed) of the Economic Machinery Company, Worcester, Mass. The latter had a capacity of 20 bottles per minute; they also introduced the "World" labeler in the early years of the 1900's.

Edward Ermold Company of New York City, had long been in the labeling equipment field with their hand-fed labeler, and its manufacture continued well into the twenties, but by 1923 they also were producing a fully automatic machine of the straight "in-line" type. During this period, also, the Economic Machinery Company added an automatic rotary unit to their line of "World" labelers, and the O. & J. Machinery Company (later Oslund Brothers Machine Co.), also of Worcester, introduced the automatic "O & J" labeler. Capacity of the latter was advertised as 80 to 100 bottles per minute.

In 1929 the Liquid Carbonic Corporation introduced its semi-automatic labeler, and some years later an automatic machine known as the "Triplex." Standard-Knapp, of Portland, Connecticut, also entered the labeling equipment field in 1935, and later acquired the Oslund labeler.

The popularity of labeling units long known to the trade, such as the Triplex, World, Ermold, and Oslund machines, continued through the years preceding World War II. However, with the advent of the applied color label in the early thirties, and its ultimate perfection as means of eliminating the paper label, there was a rapid change to the A. C. L. process.

Consequently the post-war period brought with it a decline of major proportions in the bottler's use of paper labels and equipment for applying them. By mid-century the use of paper labels was principally on bottles used for a variety of flavors by the same bottler, serving as ready means for identifying the flavor in the bottle when placed on the grocer's shelf. As a likely result of this drastic change, many of the firms formerly specializing in labeling equipment have retired from the field.

The George J. Meyer Manufacturing Company manufactures the "Triplex" labeler formerly made by the Liquid Carbonic Corporation, as well as the World labeler of the Economic Machinery Company. The Ermold labeler has been added to the equipment line of the Barry-Wehmiller Machinery Company.

MIXERS AND INSPECTORS

The numerous other items of mechanical equipment in the mid-century bottling plant, all of which did much to put the industry ahead in its progress toward full automation, are relatively recent developments.

Among these may be listed the finished product mixers, designed to replace manual mixing of the bottled drinks at the end of the filling liner, prior to placing in the delivery cases or cartons. Preliminary

forms of the mechanical mixer, a unit in the filling line which served to thoroughly mix the carbonated water and the syrup throw in the bottled drinks were developed by Meyer about 1928, but the final form of the mechanism did not make its formal appearance in the industry until several years later.

About 1935 tumbler mixers were first introduced by the Crown Cork and Seal Company; one with 6 mixing heads, and another with 12 heads. In 1937 the Miller Hydro Co. introduced its model, and in the same year the Liquid Carbonic Corporation, placed its 15 head tumbler mixer on the market. Models by Potter and Rayfield, and Keenline, were made in later years.

The spinner type of mixing unit made its appearance in 1940, as a modification and simplification of the tumbler and to create a vortex in the liquid for the electric eye inspector later referred to. A spinner unit produced by the Crown Cork and Seal Company had 12, 16, 24 and 28 heads, while the unit of the Liquid Carbonic Corporation during the same period had 8, 12, 20, 24 and 30 heads. The wide range of capacities obviously made the unit available for every size of plant, and the device quickly became common equipment.

Another item of the filling line which was well on its way to becoming universally used when World War II started was the product inspection device. The increasing number of false and frivolous claims by consumers alleging the presence of foreign objects in packaged foods, causing the manufacturer to adopt added measures in defense of such claims, provided some of the impetus for its adoption. The device, with various forms of lighting, reflectors, and magnifiers, aided the visual observation of the product as it passed on the filling line before the person whose job it was to inspect the bottled drinks. The Acme inspection box of 1916 was one of the earliest forms of this device.

Liquid Carbonic Corporation produced its visual inspection unit in 1940. Various others had been on the market for a few years preceding, and many others followed. Colored lights as a feature of the inspection unit, by Kol-Flo, presented an innovation in 1953.

A further step toward complete automation was taken when the Radio Corporation of America in 1941 introduced a preliminary model of its automatic inspection unit. An electronic device using the principle of the photocell (or electric eye), automatically inspecting the product as the bottles traveled through the unit. Any particles of foreign matter in the product were detected, and those bottles were separated from the line for rejection. Developed initially for use by bottlers of Coca-Cola, the unit became widely used. It was put into general production by RCA in 1946.

MOVING THE GOODS¹

The bottler soon recognized the labor saving possibilities of more efficient movement of bottles and cases, empties and finished goods in his plant, and the industry was one of the first to use the roller conveyor invented and patented by Benjamin Alvey in 1902. Alvey's

system had its first uses in the plants of the soda water bottlers, and in the breweries and distilleries during the 1905-1910 period. Its more common use later extended to other industries.

Many improvements and modifications in the early types of roller conveyors followed in the succeeding years, to make it one of the most essential of the labor-saving devices in bottling plants of the twentieth century.

Movement of cased finished products, as well as other materials in the plant, by means of the hand truck and the flat truck was long the common method prior to the development of the roller conveyor, and continued. The platform truck was motorized early. But there were other improvements also.

During the 1910-1920 period new concepts of materials handling brought new devices. The hand-lift truck was long in use, for the movement of materials stacked on skids or platforms, without re-handling. Powered platform lift trucks came late in this period, with Elwell-Parker as the pioneer in the electric model, and Clark Equipment in the gas-powered.

The fork-lift truck soon evolved, with the electric units starting about 1919 and preceding the gas-powered by a few years. Yale & Towne were in the field with their electric unit in the early twenties. Clark introduced their first gas-operated fork-lift models during the 1924-1928 period. In the decade which followed more gas-operated units by Towmotor, Mobilift, Hyster, and others were introduced, as well as new models by Clark.

Extensive use of the fork-lift truck and the pallet unit, however, for handling the empties and finished goods in the soft drink bottling plant, did not occur until after World War II. At that time some of the manufacturers were producing both the electric and the gas-powered units, including Lewis-Shepard, Clark, and Yale & Towne.

Supplementing the fork-lift, automatic pallet loaders soon made their appearance, with the unit of the Lamson Corporation being among the earliest.

The spiraling of costs, particularly as to labor, and the need for more efficient use of storage space, were factors influencing the adoption of this type of facility at that time, and it was rapid. Of economic necessity, it has been largely confined to the larger plants, for the full use of the new equipment also made necessary the replacement or modification of existing truck bodies for the pallet type of loading.

CASERS AND UNCASERS

Handling the finished bottled product during the casing operation, and the empty bottles as they were returned from the trade, also presented cost and labor problems.

A mechanical device for moving the bottled drinks from the filling line and into the cases (or into the 6-bottle cartons) was one solution. The Standard-Knapp and the Davis casers were innovations in that field, being developed during the pre-war period 1932-1937. The case

and carton packer of Miller-Hydro followed in 1945. Bottlers Appliances, Inc., of Salisbury, N. C. introduced its "Triple B" caser in 1947. "Cem" casers, by the Crown Cork and Seal Company were put on the market in 1954-1956. Standard-Knapp also manufactures a case packer, and a case cleaner.

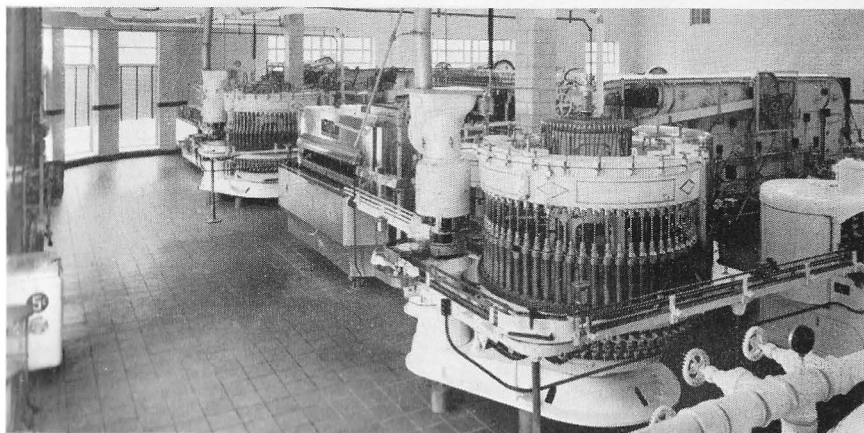
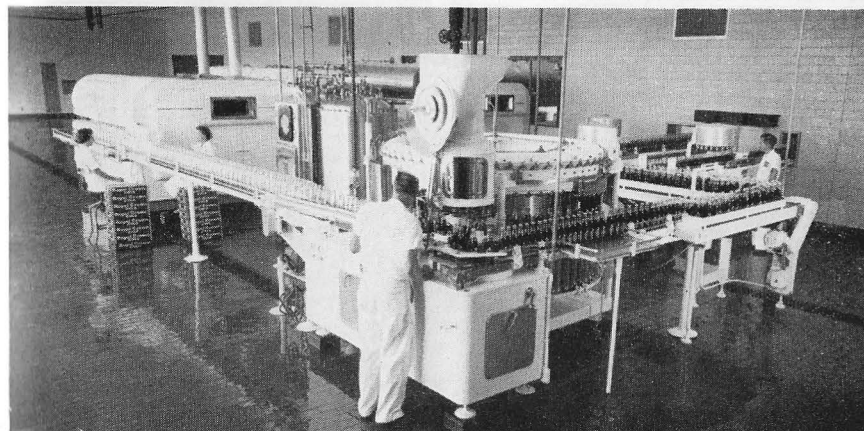
With the attention given to case packing, the case unpacker (or uncaser), was the next step. This device removes bottles from the cases as they arrive by conveyors from the unloading platform, and places them on the loading table of the bottle washer. Taylor Manufacturing Co. of Salisbury, N. C. introduced its unit in 1948, through Bottlers Appliances, Inc. Radio Corporation of America placed its unit on the market in 1949. The Meyer Manufacturing Company also is in this field.

Another novel device known as the "unscrambler," lines up the bottles on the loading table for the soaker pockets. Units in this category were introduced in 1949 by Radio Corporation of America, in 1952 by Miller-Hydro and the Liquid Carbonic Corporation, and in 1954 by Standard-Knapp. Other units are made by the George J. Meyer Manufacturing Co., the Yundt-Bottlematic, and the Archie Ladewig Company. Some of these include the unscrambler table as an integral part of the washer. Taylor Manufacturing Company combined its uncaser, and case-cleaner, with an unscrambler, as a pre-washer unit. Some of the others also manufacture the uncaser, as a separate unit.

ACCESSORY EQUIPMENT ITEMS

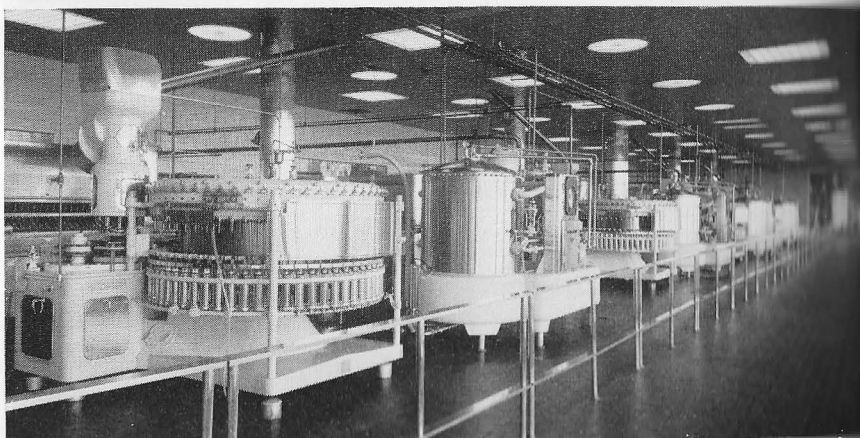
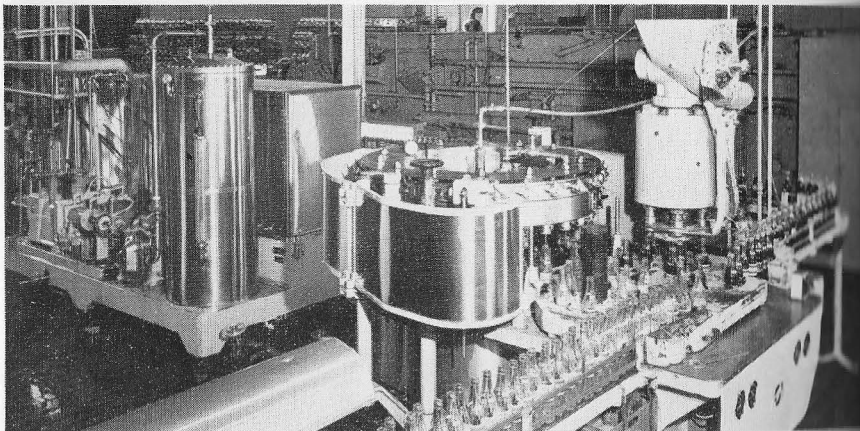
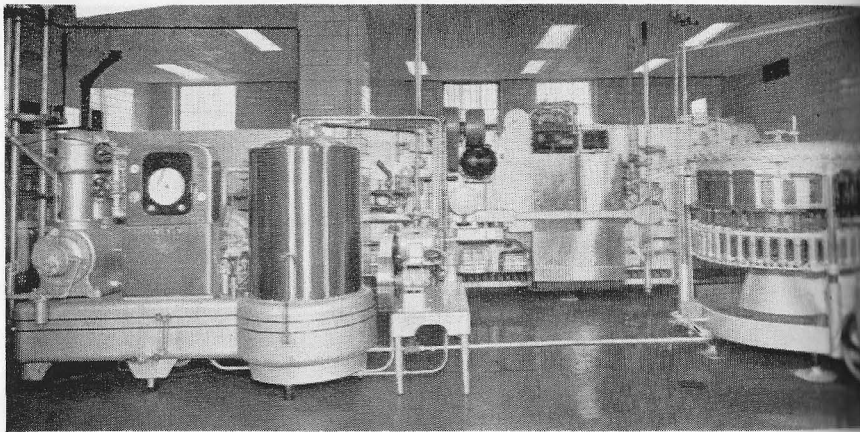
The industry's mechanical progress during the post-war period is also evident from the numerous accessory units which have made their appearance for bottling plant use as labor-saving devices. In this category would fall the Atlanta Paper Company's mechanism for setting up the 6-bottle carton for filling. The automatic case feeders for the case packers, pallet loaders, and the case cleaners are others. An innovation in the latter group is an insecticide spraying mechanism for treatment of returned bottle cases, devised by Kol-Flo Cooler Company.

Introduction of the pre-mix vending equipment also required means for cleansing the drink containers, and for filling them. Filling units for this purpose have been manufactured by Crown Cork and Seal Company, and the Kol-Flo Cooler Company. Miller-Hydro Company was early in this field with a device for the washing of the steel pre-mix containers in which the finished drink is distributed to the vending machines. Cherry-Burrell Corporation, of Chicago, is in this field, also, with both types of units.



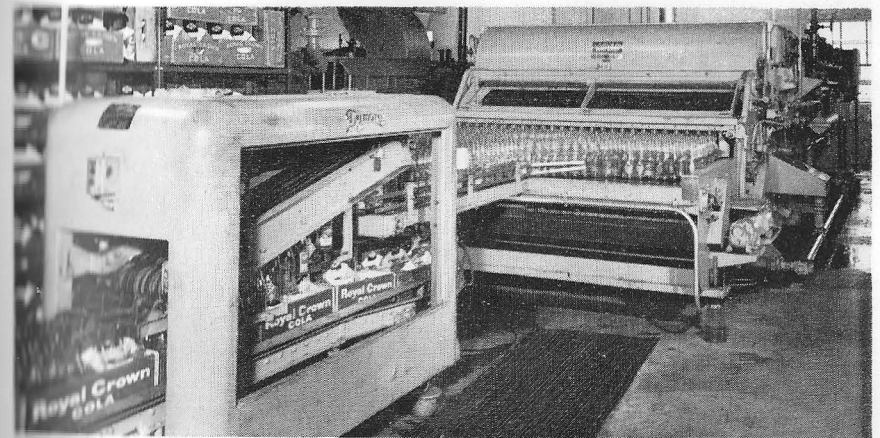
The Charles E. Hires Company (Birmingham), Nehi Bottling Company (Columbus, Ga.), Suburban Club Carbonated Beverage Company, Inc. (Baltimore).

I. THE MODERN SOFT DRINK BOTTLING PLANT



Coca-Cola Bottling Co. of Chicago, Inc., Royal Crown Bottling Co. of Baltimore, Inc., Vernor's Ginger Ale, Inc. (Detroit).

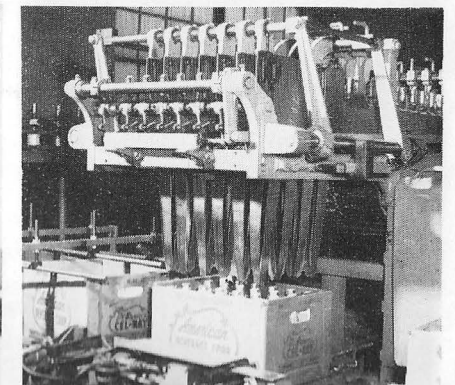
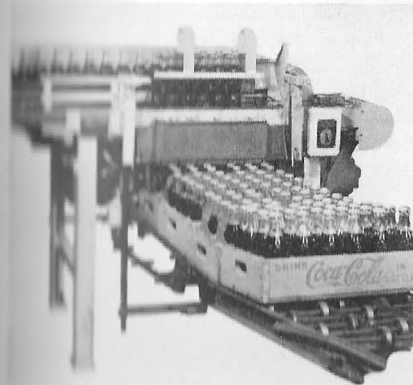
II. THE MODERN SOFT DRINK BOTTLING PLANT



Uncaser and Unscrambler Feed on Bottle Washer.

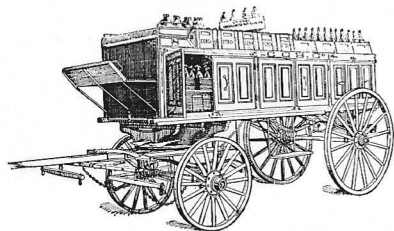


Casing the Product (Pre-Mix Product Tanks Are Shown).

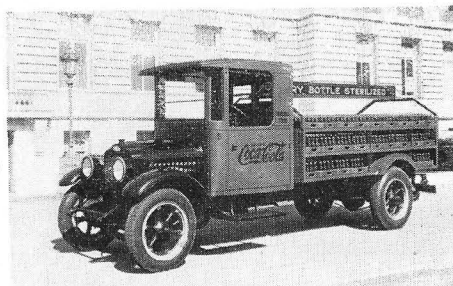


Automatic Casers (Triple-B, Standard-Knapp).

THE CASING AND UNCASING OPERATION



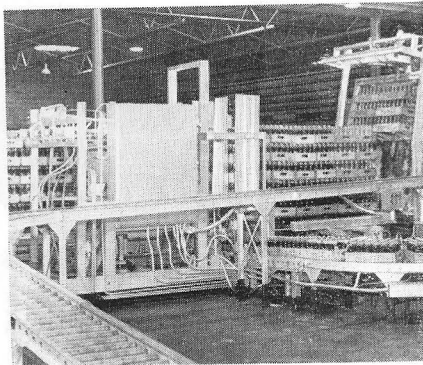
The Soda Water Wagon—1890.



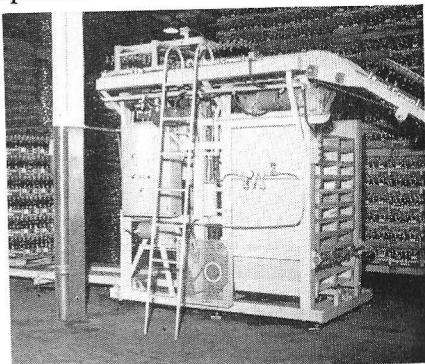
The Soft Drink Truck—1928.



Truck Loading Operations—1957.



Automatic Pallet Loaders—1957.



A Modern Delivery Fleet.
DELIVERING THE FINISHED PRODUCT

25

The Modern Plant and Industry

A COMPARISON

The growth and progress which the carbonated soft drink industry has made in America is perhaps no better indicated than by a comparison of the 1957 bottling plant with the early plants mentioned in Chapter 20 of this historical outline.

A typical plant of the mid-century years is fully motorized in its delivery and sales-routine operations. Many of such plants each cover an area equal to 600 square miles in the sales-delivery operation of their motor truck fleet. Total annual sales of the average plant approximates 250,000 cases, with the distribution quota per truck commonly set at 25,000 or more cases. In the more limited and congested consumer areas, of course, the higher rate per truck will prevail, while in rural areas a lower rate exists.

Location and construction of the mid-century plant, also, are abreast of modern developments in other fields. The bottling plant frequently is a show place in the community, pointed out with pride to visitors. This is particularly true in our smaller communities.

In the bottling plant vast changes have taken place since the early years of the pre-mechanization period. At the larger plants the sales-delivery trucks are loaded and unloaded by the motorized lift-truck, with the pallet of 30 to 50 cases as the unit of handling.

Empty bottles and cases are subject to a minimum of handling by employees, once they reach the plant for re-filling. Usually empties are conveyed to the washing area directly on the pallets, or by case conveyor. One of the modern mechanical unpackers may be used to remove the bottles from the wooden case, placing them on the unscrambler table of the washer. The empty case is routed by conveyor to the end of the filling line for reuse. Empty bottles are inspected during this operation and faulty ones discarded; all others are automatically fed into the pockets of the washer unit, and subjected to its soaking, cleansing, and rinsing processes.

Upon ejection from the washer, the sanitized bottles are again automatically conveyed, immediately and with another inspection, to the filling machine. There, using the low-pressure system, to illustrate, they pass through the filler where they are automatically syruped, filled, and crowned.

When crowned the filled bottle conveyor carries the finished product to the mixing unit, then to the inspecting device (which may be

one of the electric-eye type), to the labeler (if paper labels are used), and finally to the accumulating table for the packing operation at the end of the filling line. There, again, the bottles are automatically assembled and packed in the 24-bottle cases, some of which may include cartons ready for packing. Where cartons are used, a mechanical carton opener may set them up, after which they are placed in the wooden case by hand, and pass through the automatic case for bottle packing. Filled cases are, in turn, carried by conveyor or by lift-truck (on pallets) either to the storage area or to the truck loading platform. Mechanical pallet loaders are used in many of the larger plants.

Water used for the product is, of course, treated according to its specific requirements, in order that purity and satisfactory carbonization may be assured. Then refrigerated, the treated water is saturated with carbon dioxide in one of the modern carbonators referred to previously in this outline.

Stainless steel and chromium are important features of modern bottling equipment construction adding much to its pleasing appearance, as well as to cleanliness. The present day syrup room, particularly, with its stainless steel tanks and piping, and the numerous other sanitary measures adopted to assure absolute purity of the flavoring syrups, is a far cry from the overhead crock and rubber hose which were typical of the pioneer plants. Frequently the simple syrup is heated, or otherwise treated before flavoring, to further insure its purity. In some of the newer processes the flavored syrup is cooled to 40-50 degrees F. prior to its use at the syruper, or filler, as an aid to rapid filling.

PRODUCTIVE CAPACITY

The modern bottling plant, too, is of vastly greater productive capacity than those of the earlier years of the century. Washing, filling, and packing capacity of a filling line may be rated as high as 450-500 bottles per minute, or over 1,000 cases per hour, with the larger types of machines. Already some are promising to exceed this volume.

The industry's accomplishments in mechanization may be readily recognized by a comparison of the data in the Appendix on production and employment. As one example, estimated annual output per production employee in the average plant in 1900 is shown to have approximated 4,400 cases; in the average plant of the 1950's the average per production employee exceeds 26,000 cases of the finished product.

WORLD INTEREST IN INDUSTRY

The progress in the manufacture and distribution of bottled soft drinks made by the industry in the United States has attracted attention throughout the world. Many of the larger companies, such as Coca-Cola, Canada Dry, Pepsi-Cola, Seven-Up, Clicquot Club, Orange Crush, and others, have affiliated organizations devoted to the establishment of bottling plants and the manufacture of their products in other countries of the globe.

This world-wide interest in the American soft drink, and in the procedures used in the American soft drink business, has been evidenced during 1958 by attention given to the Coca-Cola Pavilion, at the Brussels World's Fair, in Belgium. The exhibit proved a magnet for visitors. The colorful glass Pavilion, providing an international showcase for a modern bottling plant, attracted more than a quarter-million persons a month, with daily attendance as high as 30,000 on peak days. Twenty-seven kiosks located throughout the Fair area, served the bottled drink. James A. Farley, former Postmaster General, is Chairman of the Board of The Coca-Cola Export Corporation.

CURRENT ECONOMIC ASPECTS

The economic aspects of the industry as a whole, also, present a totally different picture than in its earlier years. The total number of bottling plants has, of course, declined somewhat with the trend to larger factories and faster equipment, but the industry's total production and sales have continued to increase at the steady rate. Production for 1957 has been estimated at 1,360,850,000 cases; value \$1,347,000,000. This is the equivalent of 32.7 billion bottles, and a per capita consumption of 189.2 bottles. A comparison with prior years is given in the Appendix.

Employment in the industry during the same year may be estimated to approximate 100,000, in all employee categories. Substantially more than half of this total is represented by outside operations in the sales, delivery, promotion, advertising, and servicing functions, which have so greatly increased in importance in recent decades. The industry's annual payroll is more than \$325,000,000.

The importance in the aggregate of the soft drink bottlers to the business life of his community may be indicated by the size of the industry's annual expenditures for the raw materials and various supplies it used. For 1957 this may be estimated to total almost \$500,000,000.

In this total would be such items as the industry's annual requirement for approximately 200 million pounds of carbonic gas (liquid and solid), more than 1.5 million tons of refined sugar (cane, beet, corn), 45 million pounds of caramel, 10 million gross of bottles, 220 million gross of crowns, 23 million wooden delivery cases, and almost 700 million of the 6-bottle paperboard cartons. In the truck operations of the industry, the bottlers use over 100 million gallons of gasoline, and about 1.5 million gallons of motor oil.

The industry's total expenditures each year for advertising and promotion of its products, including such items as its outdoor and point-of-sale advertising, plus advertising space in newspapers and magazines throughout the country, and radio and television, places the industry high on that list; with annual expenditures estimated to exceed \$100,000,000.

To the foregoing, of course, would be added the industry's annual capital expenditures for replacement and expansion of its bottling plant, equipment, and other fixed assets. Regular renewal of the bottlers' motor truck fleet of more than 50,000 vehicles would be one of these items. For the last Census year of record (1954) the bottling industry's capital expenditures were reported in the total of \$47,731,000.

TREMENDOUS GROWTH OF EQUIPMENT FIELD

Some idea of the tremendous growth of the mechanical requirements of the carbonated beverage industry is given by data provided by the 1954 Census of Manufacturers (Washington, 1957).

Although the data includes the brewing and distilling industry, as well as carbonated beverage bottling, manufacture of filling-capping machines during 1954 was valued at \$7,468,000; bottle washing machinery \$6,971,000; carbonating equipment \$2,907,000; and other bottling machinery \$14,313,000. The 1954 total was only 10% less than the 1947 value of similar equipment produced in that year, and which represented the delayed replacement requirements of the several war years when equipment was not freely available.

TWO BILLION DOLLARS INVESTMENT

In the earlier years of the Census of Manufacturers by the Federal Government, data was procured relating to the total capital investment of each industry, but that information has not been reported since prior to 1920.

In the soft drink bottling industry, the thousands of its plants, their wide distribution, size ranges, and fiscal setup, are conditions which make it difficult to determine total investment. Valuable intangibles, such as formulae, trade marks, good-will and franchise values also are part of the investment, and are added complications.

However, a conservative estimate would place the total investment in the businesses of the Nation's soft drink bottling plants, in 1958, in excess of 1½ billion dollars. To this should be added the capital of the franchise companies, and others having a similar direct interest in providing American consumers with soft drink products. An estimate of 2 billion dollars representing the total industry investment, including those phases, would not be excessive.

And further progress is ahead in the business of providing America's national drink.

PART VI

The Literature, Trade Press, and Industry Associations

Industry Literature and the Trade Papers

EARLY SCIENCE TEXTS

Early interest in the artificial carbonation of waters was by the scientific fields, including the medical, and it was in the publications of those fields that the subject was first discussed in the American press. The writings on mineral waters of Dr. Benjamin Rush of Philadelphia, and Dr. Valentine Seaman of New York City are examples of such material, which was primarily of a scientific nature. Publication of textual material on the practical application of the art was an infrequent occurrence.

The first American edition of Marcet's *Conversations on Chemistry* (New Haven, 1809) reported developments at that time in the preparation of the artificial mineral waters. Marcet's book was a popular one in Europe, and it was reprinted many times in this country for school and college use. The earlier American editions include an appendix on "Manufacture of Mineral Waters," which is generally credited to Benjamin Silliman, Professor of Chemistry at Yale College, as author.

Silliman's activity in the carbonating of waters, and their bottling, has been previously described. He was also the founder and editor of the *American Journal of Science and Arts*, which he edited from 1818 until 1838. That Silliman's early interest in the simulation of effervescent natural waters was an enduring one, may readily be assumed from his lengthy discussion of that subject in the 1831 edition of his *Elements of Chemistry* (Volume II), which supplemented his lectures at Yale.

It seems doubtful whether the strictly chemical texts, such as Marcet's "Conversations" and Silliman's "Elements" found extensive use other than by the students of chemistry as a science. It is more likely that Silliman's Journal came closer to meeting the current informational needs of the technically minded student interested in the artificial mineral water field. The Journal was not a magazine of popular science by twentieth century standards, and yet its purposes included the "applications of science to the arts of agriculture, manufacture and domestic economy." And it did, over a period of years, include articles on various phases of the subject of mineral waters.¹

There were a few periodicals, and "repositories," available early in the 1800's which, to a degree, were intended to popularize scientific

knowledge. Among the first in that field was *The Port Folio*, of Philadelphia. Started as a weekly, and then a monthly, its objectives included the emphasizing of natural history and inventions. It was published during the period 1801-1827. Its report in 1808 on the bottling of artificial mineral waters in Philadelphia by Hawkins, referred to earlier, was probably the first reference in the American press to the commercial aspects of the new trade.

Books such as Fessenden's *Register of the Arts*, published in Philadelphia in that same year, is another example of textual material of this kind. For example, it reprinted the Port Folio article on Hawkins and his mode of dispensing mineral waters.

Later texts became more explicit as the processes became better known. The *American Artist's Manual* (Philadelphia 1814), for example, included an extensive article by James Cutbush, on "Mineral Waters, Artificial" in which the author commented on the ease with which natural mineral waters of Europe were being simulated, and outlined the nature of such waters, giving Bergman's analysis of each as basis for its synthesis. He described the Nooth apparatus for generating the gas and impregnating the water, as well as use of the force pump for carbonating greater quantities. Cutbush, one of the early Philadelphia experimenters, was a chemist and apothecary who published many articles of interest and value upon chemical subjects.

In 1814, also, the new edition of Accum's book on a *System of Theoretical and Practical Chemistry* contained an appendix by Thomas Cooper, in which he described the carbonation experiments of Patterson and Cloud, as well as his own.

Cooper, one of America's pioneer industrial chemists, was much interested in the subject, shown by his inclusion of a report of the chemically-minded Cutbush and Glentworth, of Philadelphia, in the June, 1814 issue of the "*Emporium of Arts and Sciences*," which Cooper edited. The "*Emporium*," another of Philadelphia's publications, was a semi-annual, issued from May, 1812 to October, 1814.

The foregoing are cited merely as examples of the American literature available to those having an early interest in the preparation of soda water for commercial purposes.

PATENTS AND POPULAR SCIENCE

A little later other American publications appeared, devoted to popular discussion of progress in the scientific and mechanical arts. For typical material, some of them depended to large degree upon the reports relating to new inventions patented in the United States, as well as in England and other countries, which they were able to cull from official sources.²

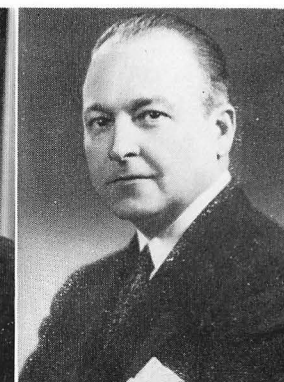
One of these, for example, was the *American Museum and Repository of Arts and Science*, published by Seth Elliott (1822-1823). Another was the *American Journal of Improvement in the Useful Arts and Mirror of the Patent Office*, a short-lived quarterly published in Washington (1828-1831) and edited by I. L. Skinner.



William B. Keller, Jr.
(1884-1944)
National Bottlers' Gazette



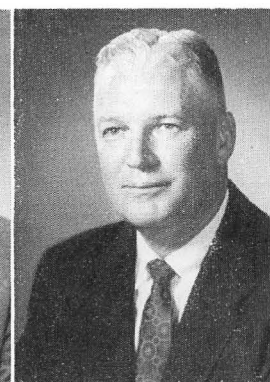
R. W. Moore, Sr.
Canada Dry



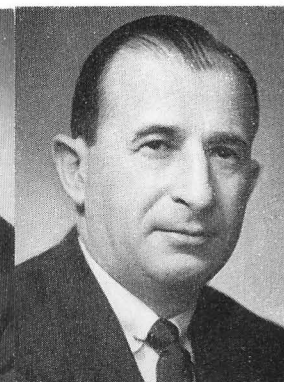
Edgar J. Forio
Coca-Cola



H. C. Grigg
Seven-Up



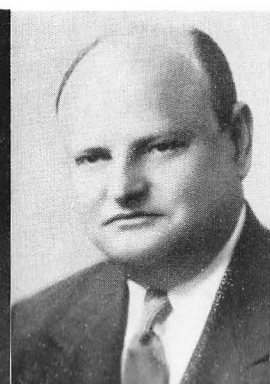
Wilbur H. Glenn
Nehi - Royal Crown



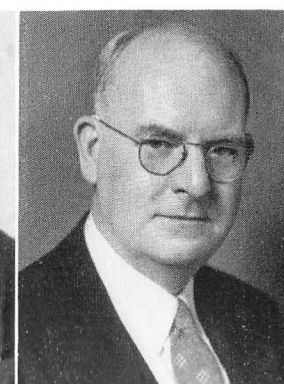
Herbert L. Barnet
Pepsi-Cola



Junior Owens (1884-1934)
A.B.C.B. Secretary, 1920-1934

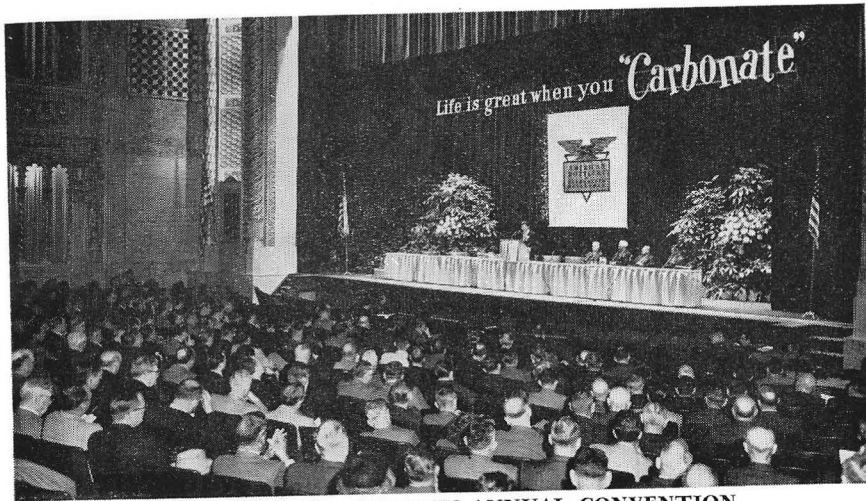


Joseph LaPides
Pepsi-Cola
A.B.C.B. Treasurer, 1937-Date



John J. Riley
A.B.C.B. Secretary, 1939-Date

SOME 20TH CENTURY INDUSTRY FIGURES



THE INDUSTRY MEETS IN ANNUAL CONVENTION



ANNUAL EXHIBITS PROMOTE INDUSTRY PROGRESS

SOFT DRINK TECHNOLOGISTS
Society of Industry Technical Men
Holds Frequent Meetings.WORLD'S FAIR—1958
Coca-Cola Pavilion is Modern
Bottling Plant: Brussels.

More important, however, was the *Franklin Journal*, later called the *Journal of the Franklin Institute*, in Philadelphia. A monthly, started in 1825 and still published, it became a most valuable source of information concerning scientific and mechanical subjects, with special emphasis on the description of patented inventions. Its first editor was Dr. Thomas P. Jones, who also was Superintendent of Patents during 1828-1829. He had published the *American Mechanic's Magazine* in 1825, merging it after one year with the new *Franklin Journal*.

The early years of the *Journal of the Franklin Institute* showed a steady increase in the reading interest of Americans in journals designed for mechanics, artisans, and manufacturers.³ Boston, Albany, and New York became prominent centers for these newer publications. In New York, the *Journal of the American Institute* began in 1835. In the same city, the *Scientific American* was founded in 1845 as a weekly, with Rufus Porter as editor.⁴ Within 5 years it was claiming a circulation of 14,000. Published by Munn & Co., also patent solicitors, its content was related to the fields in which innovations had been covered by U.S. patents. It was well illustrated, and was a valuable source of information on current developments. In its May 21, 1853 issue, for instance, was illustrated and described the Rauch invention of a machine for washing and rinsing bottles, on which patent was to be issued.

INDUSTRY TEXTS

Specific American texts on the manufacture of artificial mineral waters and soda water, did not come for several years after mid-century, and their publication coincided in large degree with the appearance of trade papers in the field.

Matthews, Lippincott, Gee, and the others who were early in the business of making carbonating apparatus and equipment for soda water dispensing and bottling, no doubt issued catalogues, and these provided the users of that equipment with the basic information they needed for its operation. John Matthews is known to have issued a catalogue as early as 1860. James W. Tufts published the first edition of his *Book of Formulas* in 1863; after several editions it was called the *American Soda Book*. Beginning in the 1870's, the issuance of such catalogues by Matthews, and the others, was a frequent occurrence. The Library of Congress in Washington has a collection of some of these.

It was not until 1882, however, that the American texts were issued in book form, and they were few. The earliest known among these was *Carbonated Beverages* by Thomas Chester (New York, 1882). It was a complete outline of the processes and apparatuses of that day, being drawn largely from a series of articles published in 1877 in the magazines *New Remedies* and *Druggists' Circular*, and from the *Carbonated Drinks Quarterly* which Chester edited. It discussed the Matthews equipment almost exclusively, and the book itself was copyrighted by Matthews.

It was in that same year (1882) that William B. Keller, Editor of the *National Bottlers' Gazette*, announced his publication of the book *Carbonated Waters—A Guide to their Manufacture* by David Smith. A small book, it included "new and valuable recipes for manufacture of all kinds of carbonated (aerated) drinks."

These two books were the principal manual type of texts available to soda water bottlers of the country for several years, or until the *Treatise on Beverages—the Complete Practical Bottler*, by Charles Herman Sulz, was published by the New York firm of Dick & Fitzgerald, in 1888. Advertised as the most complete and reliable work ever published for the mineral and soda water trade, the book of 818 pages was priced at \$10.

The Sulz book was all inclusive in its coverage, too, outlining in considerable detail matters relating to water treatment, carbonic acid gas and carbonating apparatus, bottling, dispensing, laboratory techniques, the compounding of artificial mineral waters, and the preparation of syrups and flavors. It also covered the preparation of "fermented (small) beers." Four chapters of Sulz on flavoring material had special appeal, and were also published separately for that special use, under the title "Extracts and Flavorings."

TEXTS ON FLAVORINGS POPULAR

Of course, there were other texts, but they were more restricted in scope, although several dealt with the very important matter of formulas and flavor preparation. Some of the early materials issued by John Matthews, supplementing his catalogues, included instructions to the bottlers on the making of flavoring syrups. In the period about 1890, the trade press offered for sale the London publication of J. Gilbert Smith entitled *The Mineral Water Maker's Manual*, and the *St. Paul Bottling Works' Book of Reference for Bottlers*. Both related primarily to flavor preparation.

Other available texts of that same period were less directly related to the soda water trade. These included *Harrop's Monograph on Flavoring Extracts*; the *Scientific American Cyclopedia of Receipts* (12,000 of them, 680 pages); the *Druggists' Handbook of Private Formulas*, by John H. Nelson; and *Spon's Encyclopedia; carbonated waters, beer and wine*.⁵

The lack of any substantial demand for books such as the foregoing seems apparent from the few then being offered by the bottlers' trade press, in comparison to the texts relating to brewing. More than a score of texts on brewing and other subjects were listed.

DRUG TRADE PAPERS

As a further step in this trend toward the popular type of periodical relating to scientific and mechanical developments, industrial progress of the country brought with it the introduction of increasing numbers of publications devoted to specific trades.

With the dispensing of soda water centered primarily in the drug store during the first half of the 1800's, the drug trade press conse-

quently was the first which catered in any way to the preparation and dispensing of that product, including its bottling. The magazines *New Remedies* and *Druggists' Circular* have been mentioned previously.

Trade papers such as these, and there were no doubt others, served their purposes well by encouraging the soda fountain operator, and the soda water bottler, in the proper preparation of their product and its dispensing in a sanitary manner.⁶ They continued to do this, but in the 1880's the growing importance of the bottled product was such that its own trade press was needed, and it was coming.

THE BOTTLERS' TRADE PAPERS

The importance of the decade following 1880 in development of the industry, including the entry into the field of many of the companies later to become nationally prominent in the bottled carbonated beverage industry, has been outlined. And the establishment of a vigorous and informative trade press early in those years now seems to have been prophetic in relation to what was ahead.

The English trade paper *Mineral Water Trade Review and Guardian* had been published in London since 1873 by J. Gilbert Smith, and was offered to American bottlers as the "first paper ever published in the interests of the carbonated beverage trade." Edward O. Adams, also of London, edited and published *The National Mineral Water Trade Recorder and Bottlers' Advocate*, establishing it in 1876 as "a journal devoted to the interests of manufacturers of aerated waters and bottlers of ale, porter and other beverages." It seems doubtful that the circulation of either of these in America was substantial.

Yet, there was an apparent need for such a medium of popular information concerning the growing trade, and beginning in July, 1877 the *Carbonated Drinks Quarterly* was published in New York City, at 449 First Avenue. It would appear to be the first regularly published American paper of record serving the soda water trade primarily. E. E. Sterns was its first Editor, serving until 1880. With the April, 1880 issue the name of Thomas Chester appears on the masthead, as Editor; he later authored the book *Carbonated Beverages*, as previously noted.

Subscription price to the Quarterly was 50¢ a year, and it was "devoted to the interests of those engaged in making, bottling or dispensing sparkling beverages, including mineral waters both artificial and natural." The advertising pages of the magazine were confined to promoting the John Matthews equipment and supplies, and much of its reading matter was similarly limited. The Quarterly had a relatively short life, being discontinued with the April, 1883 number. The same number also included an announcement of the death of John Matthews, the junior, during the preceding month.

Then, in 1880 the *Western Brewer* was established in Chicago, but until the coming of prohibition on January 1, 1920, its primary purposes were to serve the brewing industry, and it was not of major

interest to the soda water bottler. In June, 1920, with the brewing of malt beverages no longer a legal industry, the name of the magazine was changed to the *Beverage Journal* and its columns were directed to the soft drink industry by the publishers, H. S. Rich & Company. The paper continued until 1932, when publication was suspended.

An innovation in the field by the Beverage Journal was issuance in 1923 of *The Beverage Blue Book*. The first of its kind, it was issued as a directory, buyer's guide, and reference volume for the beverage industry, it included a list of soft drink bottling plants and brewing plants in the United States and in Canada, suppliers' advertising, and a classified list of suppliers of the various equipment and materials required by the bottler. The reference material comprised a variety of technical information related to bottling plant operation and the soft drink business. The Blue Book was issued at irregular intervals; later editions were published in 1925 and 1930.

PETERS, KELLER, ET AL.

In the year 1881, with W. A. Peters as Editor and Publisher, *The American Carbonator and American Bottler*, started publication in New York City as "an illustrated monthly journal devoted to the general bottling trade and the soda water counter." On its masthead it also used the title *The American Carbonator and Bottler*. In 1906 it became *The American Bottler*, which will be referred to later.

In 1882 William B. Keller (1852-1929), after several months spent in the trade in a preliminary publishing venture, began the editing and management of the *National Bottlers' Gazette*. The issue for March, 1882, was Volume I, No. 1, to be "published monthly in the interest of the bottlers and manufacturers of carbonated and other beverages." In his first editorial Editor Keller promised—"It is enough for us to know that the bottlers of this country demand a journal—a practical journal and that is just what we propose making *The National Bottlers' Gazette*." Subscription was \$2 a year.

Both the *American Carbonator and Bottler* and the *National Bottlers' Gazette* became effective media for instructing and informing the industry, and their advertising columns were consistently used by all of the major suppliers in the field. Issues of the magazines during their earlier years, therefore, were quite consistently of similar nature as to advertising content, and both were of a high level in reports of industry activity. They included many articles relating to bottling plant operation and instruction in semi-technical matters.

Editor Keller of the *National Bottlers' Gazette*, however, soon demonstrated qualities of aggressiveness and forthrightness which were to establish him as a leader in the field and to characterize his magazine throughout its many decades to follow. His keen interest in the scientific background of the industry, and in the history of its development, is apparent in the many columns devoted to those subjects during the long period he supervised contents of the magazine. And the attention he constantly gave to instruction in efficient and sanitary operation of the rapidly changing bottling plant, as well as to progress

in those practices essential to the industry's business development, is most apparent from the magazine's contents through the years.⁷

At the death of Editor Keller in 1929, he was succeeded by his son William B. Keller, Jr. (1884-1944), as Editor. Since death of the latter in 1944 the *National Bottlers' Gazette* has been published by the Keller Publishing Company, B. S. Keller, Publisher, and Morris J. Becker, Editor.

A magazine titled the *Western Bottler* appeared in August, 1885, of which Henry Gathmann of Chicago was publisher. It was announced as a "monthly journal of the bottling trade in soda water, mineral water, beer, ale, porter, weiss beer, cider, and wine." Its style and content were quite similar to those already in the field, but it was short-lived.

Although its interests were in the field of "bottlers of lager beer, ale, porter, stout, and weiss beer" it may be of interest to note the appearance in September, 1891, of the first issue of the *American Beer Bottler*, published and edited in New York City by Wm. B. Keller, the editor of the *National Bottlers' Gazette*. It was priced at \$1.50 a year. After about 3 years its publication was suspended.

As the years of the 1800's drew to a close the industry of more than 3,000 bottling plants and their many suppliers therefore had available the many advantages of the printed word in its effort to progress.

TRADE PRESS AFTER 1900

At the 1905 annual meeting of the American Bottlers Protective Association, plans were initiated for the establishment of a trade journal for the association membership. This involved the purchase of the *American Carbonator and American Bottler* magazine, previously mentioned. Ownership of the media, however, was by a list of bottlers who provided the funds. Publication monthly under the name of *The American Bottler* was started in 1906, by the American Bottler Publishing Company. Charles Jacobsen, of Washington, D. C., was President, and William T. Phillips, of New York City, was Secretary of the publishing company. Phillips, who was also secretary of the A.B.P.A., served as Editor of the newly-named publication for a long period. Publication was suspended with the May, 1924 issue. A short-lived paper, started about the same time as the above, was *Carbonic Acid and Carbonated Beverages*, published by Nickerson-Collins Company, of Chicago. Its run was from January, 1905 to January, 1909.

The years of fast development of the industry in the southern States following the turn of the century brought with them the establishment and monthly publication, beginning in February, 1905, of the *Southern Carbonator and Bottler*, by Donald A. Loyless, in Atlanta. Loyless also served as its Editor until 1931, when his son, A. S. Loyless, assumed the editorial post.

Twenty years of publication, however, had proved that such a publication serving the entire industry should be identified with it nationally, and with the January, 1926 issue the paper's title was

changed to *National Carbonator and Bottler*. Later, with the January, 1946 issue this was again changed to *American Carbonator and Bottler*; in January, 1950 to *American Bottler*; and in November, 1955 to *American Soft Drink Journal*.

As a novel departure from trade press reporting at the time, during the years 1944-1947 the Atlanta magazine published a Mid-Month News, simulating to a degree the tabloid newspaper style, as a newsy means of supplementing its regular issue to subscribers. Also, in 1936 it published its first issue of the "Blue Book," which has continued annually. The Blue Book, intended as a current reference text for the soft drink bottler, is a compendium of technical data and current items of business interest to members of the industry, plus a comprehensive listing and advertising of the sources of equipment and supplies. A Special News Letter, issued monthly since September, 1954, serves as a means of bringing a digest of current industry developments to subscribers in the interim between issues of the regular Journal.

In 1949 ownership of the magazine passed from the Loyless interests to the Banker's Publishing Company, with Bradford McFadden, as Publisher, and Ben Ginsberg, as Editor.

In 1946 Don Gussow Publications, Inc., of New York City, publishers of several trade magazines in the food field, entered the bottled soft drink industry with a new bi-weekly paper titled *Bottling Industry*. Departing somewhat from the conventional trade paper format, the new publication assumed a semi-newspaper style, presenting both current news developments and information about the various problems of the bottling industry.

Bottling Industry Technology, and Bottling Industry Marketing, are regular departments in the paper's coverage. Publisher of *Bottling Industry* is Don Gussow, who is also president of the corporation. First Editor of the paper was Dan Burns (1946-1953), who was succeeded by Jerry Stevens. Arthur Yohalem is Executive Editor.

Another, the *Mid-Continent Bottler*, made its debut with the issue of November 1946 as a "monthly merchandising magazine for soft drink bottlers." A magazine of Financial Publications, of Kansas City, Missouri, Henry A. Bodendieck is Publisher, and D. L. "Mike" Michael the Editor-Manager. As a special feature of the *Mid-Continent*, in a series of reports titled "Meandering with Mike," Editor Michael discusses visits with bottlers in a wide area, and comments on their plant, equipment, and methods of operation, and presents the view of the bottler visited on matters of industry concern. More than 1600 plants have been visited and reported in this way. Eighteen States are covered.

Magazines with primarily a regional interest, have taken their place in the field, and have served those interests well. From 1919 to 1937 the *Pacific Bottler*, a monthly, was started in San Francisco, to serve the industry in the twenty-two western States, and in Alaska, Hawaii, Pacific Islands, and Western Mexico. Clyde D. Lightbody was Editor for several years, and for many years also served as Secretary of the

California Manufacturers of Carbonated Beverages, the association of that State.

In 1937 the publication was purchased by the Occidental Publishing Company, and with the June, 1937 issue the name was changed to *Western Bottler*. H. M. Marquis was its new Editor. Later for a ten year period its publishing policies were guided by Reg Burrows. Currently it is edited and managed by Thomas Penfield. R. E. Powell is Publisher.

The *Southern and Southwestern Bottler* appeared with its first monthly issue in January, 1945, with its interests directed to the southern half of the country. It was published in New Orleans, with Ruel McDaniel as Publisher, and Newton Evans as its first Editor. Publication was suspended with the January, 1950 issue, when the paper was combined with the *American Carbonator and Bottler*, of Atlanta.

The *Canadian Beverage Review* was founded by B. L. Smith in 1923, as "the only Canadian publication serving the carbonated beverage, brewing, distilling and wine making industries." Since 1951 it has been published bi-monthly by the B. L. Smith-McCarthy Publishing Company, Ltd., of Toronto. E. J. McCarthy is Publisher; G. Howard Cash is Editor.

Expanding interest in the American soft drink industry and its methods of manufacture and distribution is shown by the start of new beverage trade publications catering to the Latin American countries.

Prominent in this field is *El Embotellador*, a Spanish language quarterly, published since 1946 by the Keller Publishing Company of New York City, publishers of the *National Bottlers' Gazette*. Fernon Calderon is Editor of *El Embotellador*.

Bebidas, Spanish bi-monthly, has been published by the Canterbury Press of Chicago, Illinois, since 1942; Luis Zapata, Editor. An English language paper, *Beverages*, is also published for the beverage export trade.

The trade papers of the bottled carbonated beverage industry from their inception have published volumes of technical and instructive material on bottling plant operation and product manufacture, in all phases. This was supplemented materially by the issuance by American Bottlers of Carbonated Beverages of numerous papers on technical subjects, particularly during the maintenance of the A.B.C.B. Fellowship at Iowa State College from 1923 until World War II. Much of this data was published in the trade papers, and issued by the association in booklet form, also.⁸

However, the association text *Plant Operation Manual* published in 1939, was the first comprehensive text on bottling plant operation in book form, issued since Sulz's treatise of 1888. The Manual was later revised and superseded by the book *Beverage Production and Plant Operation*, first published by the association in 1946. The association's list of manuals and other publications for assistance of the soft drink bottling plant operator have served to provide him with a ready source of helpful material.⁹

Current association activity and major industry developments are reported by the association to its membership in its *Monthly Bulletin*, published regularly since 1920. The association publication contains no industry advertising.

HOUSE ORGANS AND OTHERS

With the increasing numbers of bottlers of proprietary brands of soft drinks, under franchise, another type of publication has become prominent in the trade, directed to promoting the particular brand and the interests of its bottlers.

Typical of these was early publication of *The Coca-Cola Bottler*, with its initial issue for the month of April, 1909. Its first Editor and Publisher was J. J. Willard, of Hickory, North Carolina. With the January, 1944 and succeeding issue *The Coca-Cola Bottler* was published by the Hickory Publishing Company, of Atlanta, with Frank Rowsey as Editor. J. J. Willard is Editor Emeritus.

Others in this category include the *Clock Dial*, published bi-monthly for bottlers of Dr. Pepper by the Dr. Pepper Company, of Dallas. Issued first in April, 1938 as the *Pepper-Pot*, the *Clock Dial* name has been used since 1947. Harry E. Ellis is Editor.

The *Pepsi-Cola World* is a monthly publication of the Pepsi-Cola Company, of Long Island, issued since 1940. Gary A. Lewis is Editor.

In the interests of Seven-Up bottlers, the *Seven-Up Refresher* is issued monthly by the Maher Management Corporation, of Des Moines, Iowa.

As a means of contact with its bottlers, the Nehi Corporation, of Columbus, Georgia, since December, 1955 has published the *Nehi Contact* on an irregular schedule. It superseded the *Nehi News*, which was published for several years.

Missiongrams is issued by the Mission Dry Corporation of Los Angeles, for bottlers of its products. It is a monthly.

Nesbitt's News Bits also is a monthly, published in the interests of its bottlers by Nesbitt Fruit Products, Inc., of Los Angeles.

Then there are others of similar nature, but for more general circulation. With the growth of the industry during the twentieth century, many of the suppliers to the soft drink bottler deemed it helpful, in addition to use of their regular advertising media and as means of keeping in touch with the customer field, to publish house organs in which matters of industry interest are discussed, as well as their products.

The *Liquid Bottler* was one of the earliest of these, and covered the trade for a period of many years as a publication of the Liquid Carbonic Corporation of Chicago. It was started in 1910; publication was suspended in 1931.

In February, 1912 the Crown Cork and Seal Company, of Baltimore, published the first issue of *The Crown*. John R. Wilbor was its Editor

for many years; N. D. Grasty edited it for several years. Published in the interest of users of crowns and other products of the company, as a monthly, it covers a broad field and has a wide distribution in the user industries. Editor is F. T. Murray; Sylvia Sard is Associate Editor.

Of similar nature, in the flavor field, are *Twitchell Talks*, of S. Twitchell Company, Camden, N. J. published since January, 1923, and *The Hurty-Peck Idea* of the Hurty-Peck Company, Indianapolis, published since 1920.

Circle 'C' Chats, is a publication of the Chattanooga Glass Company, "distributed to the trade for their entertainment and enjoyment."



Early Proprietary Bottles

27

The Industry Associations

THE 1882 MOVEMENT

The growth of the bottling trade during the later 1800's, referring to the then common practice of bottling both beer and soda water, had shown the advantages of organization for cooperative action on the problems of those engaged in that activity. Many State and city associations had been formed and were active in the field. But there was no national organization.

In the second monthly issue of the *National Bottlers' Gazette*, April of 1882, Editor W. B. Keller suggested the need for a national organization in the bottling industry, and suggested that an exhibition of bottling equipment and supplies be held the following fall as a means of bringing the bottlers together for that purpose.

Mr. Keller's suggestion brought prompt response from members of the supply and equipment field, from numerous bottlers, and from several of the State and local organizations already functioning. And the gathering was planned for the following November, in Pittsburgh, Pennsylvania.

U.S. BOTTLERS' PROTECTIVE ASSOCIATION

The first meeting was held November 15 and 16, 1882, at Central Turner Hall, in Pittsburgh, with the exhibit open from November 14 to 17. It was at this meeting that the United States Bottlers' Protective Association was formed. It served as the industry's national association from 1882 to 1886.

As the name of the organization indicated, its primary purpose was a protective one. A principal objective was means of halting the pirating of bottles, particularly the shipment of stolen bottles from one part of the country to another. Little progress was made by the new association in its efforts to secure passage of a Federal law prohibiting this traffic, or in its efforts to convince the Government that imported carbonated waters, duty free, constituted unfair competition, which was another problem.

The waning interest in the United States Bottlers' Protective Association shown in connection with its 1884 and 1886 meetings seems to have been reason for failure to hold the 1888 meeting, which had been planned for Chicago.

AMERICAN BOTTLERS' PROTECTIVE ASSOCIATION

The U.S.B.P.A. was followed by the American Bottlers' Protective Association, organized in September, 1889. Also, with the new organ-

ization, the important problem of protecting the bottlers' property rights in their bottles was a principal purpose of its founding. The diversion of bottles, it was reported, was causing members of the industry a loss of several million dollars a year.

Pledged to the elimination of this loss, the A.B.P.A. continued to attract new members, and at the 1894 meeting, a proposed Federal Bottle Law was approved by the membership and referred to a special committee for the purpose of having it introduced in Congress. Although the measure actually passed the House of Representatives in 1896, successive failures to secure its passage resulted in a decision by the association in 1899, to abandon the Federal approach and press for passage of stringent laws in every State.

War—this time the Spanish-American conflict—introduced the first threat of a Federal tax on soft drinks early in 1898. The association was active in showing the unfair and unproductive nature of such a tax, and its enactment was avoided.

Another milestone was passed at the 1901 meeting, when A.B.P.A. members endorsed a proposal to adopt bottle deposits as a step toward solution of the still prevalent stolen bottle racket. Many years passed before the deposit practice became popular, and for several years afterwards the association was active in urging local groups to encourage adoption of the deposit system.

Annual meetings were held, but during the early years of the 1900's interest in the association lagged on the part of the carbonated beverage bottlers. This was largely due to the fact that membership of the A.B.P.A. included both bottlers of beer and bottlers of soft drinks—a situation which frequently resulted in divergent objectives.

Sentiment favoring the reorganization of the association to include only bottlers of soft drinks was voiced at the 1910 and 1911 meetings, and in 1912 came out into the open in the form of a recommendation proposing the exclusion of beer bottlers. No action was taken, however, and the industry entered the period of World War I, in 1914, considerably divided in its organization, but with participation by beer bottlers waning.

NATIONAL BOTTLERS' ASSOCIATION

During the early years of World War I, the experiences of the bottled beverage industry, and particularly its problems related to tax legislation, had clearly shown the need for a stronger national association to cope with them. That was the compelling reason for the action taken at the 1918 meeting of the American Bottlers' Protective Association to reorganize and to form a new national association.

At that meeting a new Constitution and By-Laws were adopted, and the name of the association was changed to the National Bottlers' Association. Frank A. Wegener, of A. Wegener's Sons, Detroit, Michigan, who had been elected President of the A.B.P.A. at the 1917 meeting, was re-elected President of the new organization.

This organization was in existence only one year, its efforts being directed toward tempering the Federal 10% soft drink tax levied

under the Revenue Act of 1918, which also included many other new revenue measures required to meet the costs of World War I. But the association lacked the representation from the States, which was so essential for its basic purpose—to rid the industry of the unjust tax on its products.

A.B.C.B. FORMED IN 1919

President Wegener led the move for a stronger and more representative organization which he and many others believed should be the industry's first objective. The next year, at a meeting in Chicago on November 6, 1919, the American Bottlers of Carbonated Beverages was formed.

James Vernor, Jr., of the James Vernor Company, Detroit, was elected the first President of the new organization.¹ Its initial membership included approximately 600 individual plants, and 33 State and local associations.

Primary objective of the new association was the elimination of the unfair Federal tax burden on its products, and the early years of the association's work were devoted almost in their entirety to this cause.

WARTIME TAXES REPEALED

Success attended the efforts of the new association late in 1921. In that year Congress recognized the equity in the position of the industry, to the extent that the special tax burden was modified. The 10% excise on sales of soft drinks was repealed effective January 1, 1922 and a somewhat less burdensome tax substituted. This was a tax of 5¢ per gallon on finished syrups, 2¢ per gallon on unflavored mineral waters, and a tax of 4¢ per pound on carbonic gas used in beverage manufacture.

Through continued effort these gallonage and carbonic gas taxes were repealed on June 2, 1924, and excepting for a relatively short period during the depression years 1932-1934, the products of the industry have been free of this type of special tax.

With relief from the onerous tax developments of World War I, energies of the association were then directed toward some other phases of the industry's economic welfare. In 1930, for example, higher sugar cost threatened, for Congress was considering an increase in import duty from 1.76¢ to 2.4¢ per pound. Industry and user objections kept the increased duty at 2¢ per pound. The serious matter of product quality also was given studied attention.

SANITATION AND QUALITY

During the later years of the first decade following organization of the A.B.C.B., special emphasis was given to placing the industry's production function on a level equal to its steadily growing importance in the food products field. Proper plant operation, especially from the standpoint of sanitation and product quality, was basis for beginning by the association of a program of scientific study and re-

search. This was done through a Research Fellowship at Iowa State College, starting in 1923. The training of the Fellows for a career in the technical phases of the industry's operation was also a part of this program, which continued until World War II.

During the years of its activity at Iowa State College, first under the direction of Professor John H. Buchanan and later under Dr. Max Levine, the A.B.C.B. Fellowship prepared and released to the trade a steady flow of the technical information which it had so sadly lacked. One of the most important of these items, developed in cooperation with a committee of association members as a voluntary guide to more satisfactory plant operating procedures, was the A.B.C.B. Sanitary Code of 1929. The trade press cooperated fully in giving this material circulation in the industry, and the association published numerous compilations of the same data.

Carrying the plan to supply the industry's technical needs further, in 1930 the A.B.C.B. opened its service laboratory at the Washington headquarters, for the assistance of members. In 1936 this was expanded further, with the fitting out of a mobile field laboratory manned by trained personnel to visit member plants and aid them in their operating difficulties. Both of these facilities have continued.

AWARDS PROGRAM

In 1944 the association announced an award for current contributions to the scientific progress of the industry and to encourage research. It was named the Chesterman Award, after C. B. Chesterman, early A.B.C.B. President and sponsor of the Fellowship program at Iowa State College. Professor Buchanan received the first Chesterman Award.²

In 1944, also, the award of an A.B.C.B. Medal of Industry Service was started, as means of recognizing contributions by members to organization and to the progress of the industry. First award of this kind was to James Vernor, Jr., for his many years of participation in association activities.³

THE PUBLIC AND PUBLICITY

In the early twenties the American consumer was familiar with "carbonated beverages," although he probably knew them better by the terms "soda water," "soda," or "pop," which had been common terminology for so many decades. But the industry's optimistic view of its future was based to a large extent upon proper cultivation of consumer preference for its products. Many consumers were prone to look upon soft drinks as one of those products to be enjoyed only at the ball game, or at the picnic. Some were influenced against them because of the lowly nature of bottling establishments in their own communities during the years before. By far the greater number, however, just had not been made aware of the qualities of bottled carbonated beverages.

A program of publicity was one of the first developments in the 1920-1930 program of the association, as one means of helping to make

the American consumer think of soft drinks more frequently, and more favorably. Late in the twenties, after years of planning and discussion, this was supplemented by a national advertising program in which the wholesome and refreshing characteristics of carbonated beverages were called to the consumer's attention. Through the A.B.C.B., the industry subscribed to a National Advertising Fund totalling almost \$900,000, which during 1926-1929 was used for a series of ads in magazines of national circulation, and in newspapers, extolling to the consumer the beneficial and wholesome qualities of bottled carbonated beverages.

MANAGEMENT AND COSTS

The economic phases of the industry's operations, also, received the serious attention they merited. The industry had grown too rapidly to attain that degree of order and efficiency in operations which were typical of the major manufacturing groups. Bottlers' selling practices were governed more by the competition than by any consideration of costs. A demonstration, by association survey, that many members of the industry were operating unknowingly as a loss was the eye-opener.

Followed by nation-wide circulation of special texts on efficient management and cost control, and the development of a standard accounting system for bottling plant operation, the result was more general understanding in the industry of the vital importance of these basic factors. Annual surveys of cost trends and sales were undertaken as a means of providing soft drink manufacturers with basis for comparing the results of their individual cost and sales efforts with those of the industry in general. These have provided the industry with a source of valuable current data.⁴

Having another important bearing both on costs and on sales, the filing of false and frivolous claims by the claim-conscious individual has long been a problem throughout the food products field. Soft drinks, particularly, for many years seemed to be the target for this type of racket, which provided reason for the association to take steps early in its active life to encourage the proper type of insurance for members, and to urge insurers to resist such claims to the utmost.

That the association activity along these lines made its contribution to the rapid progress made by the bottled soft drink industry during the twenties cannot be doubted. It was still expanding rapidly, but through these new types of cooperative effort it was given the over-all assistance needed to obtain full benefit of its management and merchandising advances. Bottled soft drink sales in 1929 represented the all-time peak, and was not to be reached again for several years.

IN THE THIRTIES

The years of the Thirties represent another cycle of association activity, not very different from the preceding decade insofar as promotion of industry progress is concerned, but with new problems resulting from the changing times. They were years which brought a

new concept of the cooperation and industry representation which could be had only through effective organization.

The broader aspects of the economic depression were, of course, the Nation's primary problem. But during the depression the soft drink industry's problems of discriminatory taxation arose anew. The N.R.A., the Code of Fair Competition, expanding Federal authority, and the multitude of novel far-reaching governmental regulations which followed, all served to substantiate the warning of industry leaders in 1918-1919 that only through a strong national organization could the problems of constant change in a growing country be met by one of its smaller industries. Certainly coordinated direction of activity through the A.B.C.B. during the depression years was a factor which helped the soft drink bottler to be one of the first to achieve his pre-depression position. In 1936 all lost ground was regained by the industry, value of its production for that year reaching a new high.

One of the obstacles the industry had to overcome was the reenactment in June 1932, of the Federal tax of 5¢ per gallon on bottler's syrups, and 4¢ per pound on carbonic gas. The levy was one of the makeshift measures approved by Congress as a means of recouping dwindling revenues resulting from the depression. As a revenue producer, however, the tax was found as unsatisfactory as when previously levied. Its harmful effect upon the industry, already facing the possible effects of prohibition repeal on soft drink consumption, was another reason for the removal of the tax on May 10, 1934.

THE WORLD WAR II YEARS

The industry progressed rapidly each year until Pearl Harbor on December 7, 1941. Shortages of materials and manpower soon became typical of civilian industries during the critical period that followed. Despite these difficulties, excepting for 1942, the industry was able to maintain a modest record of sales growth during the war years. With exceptionally high demands for soft drinks by the armed forces, by workers in industrial plants, and by consumers generally, coupled with the resourcefulness of the individual bottler in coping with wartime problems, average annual sales during 1941-1945 approximated \$572,000,000.

Nevertheless the events of World War II created another era in association activity which had no counterpart in the past. Restrictions of the first World War were insignificant in comparison. Shortages of crowns, sugar, bottles, cases, gasoline, trucks, equipment, manpower and virtually everything else required for production and business operation were problems of everyday occurrence. Rationing created many difficulties. This was true of sugar rationing particularly, even though extra rations of the sweetener were provided for bottled drinks intended for the armed forces and for workers in industrial plants.

New and numerous restrictions with rigid regulation of prices and wages and even threatened suspension of industry operations, were

all wartime situations with which the industry had to contend. Concentration of the industry into restricted plants, and even standardization of its containers also were threatened as measures to serve the wartime economy, but they did not materialize. In the matter of industry representation the association was the logical vehicle for just such emergencies. That was its function and it worked continuously in that way.

Official advisory committees appointed by the Government from the association membership, and others, were constantly active and did much to alleviate the greater difficulties which otherwise would have been experienced. Other voluntary committees also worked on the general activity of the scrap metal drive, the bond campaigns, and so on. In all such work the association took a prominent part, giving its full assistance and cooperation, and won high praise from Government for its effective representation of the industry on these numerous wartime situations preceding V-E Day on May 8, 1945 and V-J Day on September 2, 1945.

With the war's ending, many problems remained for the transition to a peacetime economy, even though gradual easing and early termination of most of the control measures came about. Equipment, supplies, and manpower were still short. And the situation regarding the sugar supply was such that the rationing of that important commodity continued for bottlers and other industrial users until July, 1947.

A NEW PUBLIC RELATIONS OBJECTIVE

The tasks of the war period were made particularly difficult by an attitude found in many wartime agencies, and in segments of the public, holding that the industry was one dealing in a luxury product, and therefore could be dispensed with or drastically restricted during the emergency. This, then, was reason for activity, through the association, to show the industry's true status as a segment of the American food products field, and of its economic importance to the more than two thousand communities in which its businesses were located.⁵

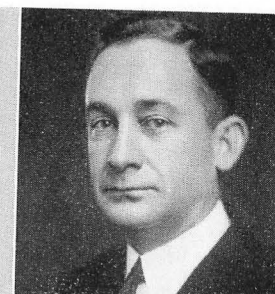
During the wartime period, therefore, the association's public relations activity was intensified, and a better public understanding of this point of view became its objective.

The measure of success which attended this effort also was reflected in later activity in the early fifties when an extended period of views which minimized the value of soft drinks as items of common consumption was faced. Members of the health and teaching professions were the principal critics. Their opinions seemed obviously based on misinformation, or lack of information.

A program of several years' duration was undertaken, its purpose being the providing of authentic information concerning the origin of carbonated beverages in the health field, and their wholesome, beneficial, and refreshing qualities. Association publicity and advertising in the journals of the medical, dental, teaching, nutrition, and



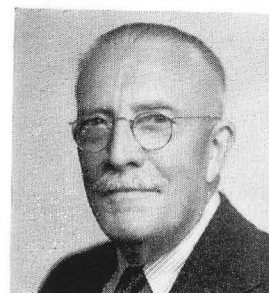
James Vernor
1877-1954



C. V. Rainwater



Sidney W. Lee
1864-1944



Wm. B. Hatfield
1866-1945



C. B. Chesterman



Carl A. Jones
1879-1950



Virgil Browne



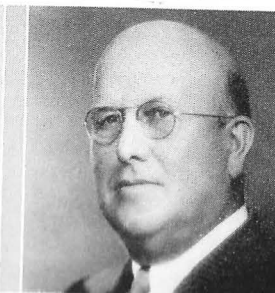
Martin L. Schmidt
1890-1949



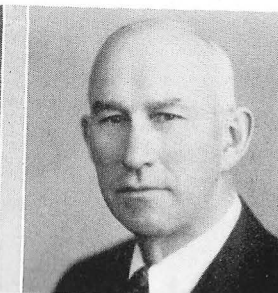
Thomas Moore



Charles P. Nevin
1881-1936



George S. Derry

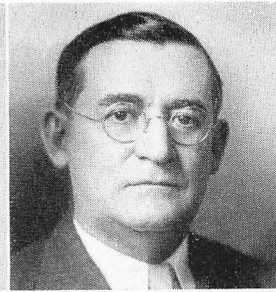
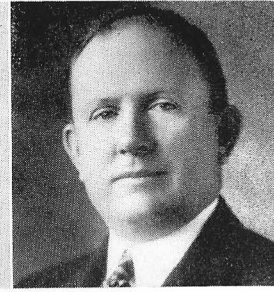


Paul F. Glaser

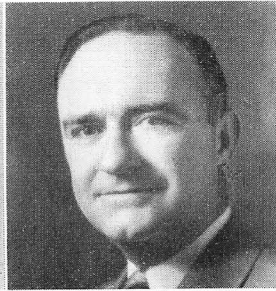
I. PRESIDENTS OF THE NATIONAL ASSOCIATION: 1919-1957
See Chapter 27 for Presidential Terms



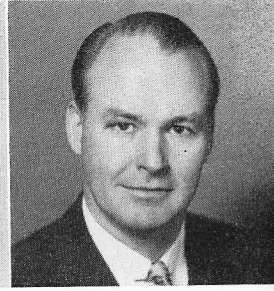
Edward Wagner

John F. Leary
1886-1958Joseph W. Milner
1892-1950

Thos. F. Mansfield



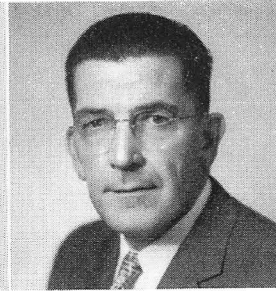
Truman M. Gill



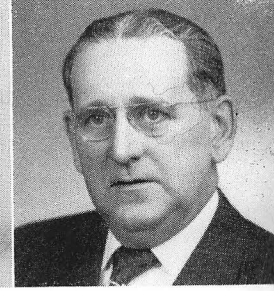
Alvin G. Beaman



E. Robt. Anderson



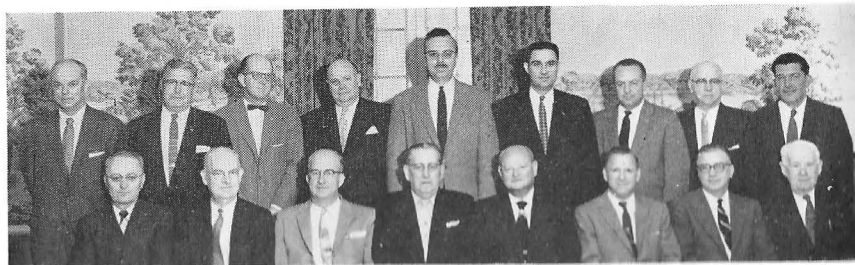
Joseph F. Nerney



Edwin F. Wagner

II. PRESIDENTS OF THE NATIONAL ASSOCIATION: 1919-1957

See Chapter 27 for Presidential Terms



A. B. C. B. EXECUTIVE BOARD—1957

other opinion molder groups, were important features of this A.B.C.B. program. And, in addition to the intensive effort and time spent by the association committees and members who took part in the activity, over a period of ten years the A.B.C.B. expended in excess of \$600,000 in the direct costs of this important work.

POST-WAR ACTIVITY

The post-war problems of the industry also required the combined assistance of association membership in other directions. The transition from a war economy to a new peace-time status presented many obstacles. Scarcity of new equipment and the materials for manufacture of it caused many difficulties, as did shortages of structural steel and other elements vital to rebuilding many of the bottling plants to suit their new and expanded requirements. The solution of these and many other conversion problems was greatly aided by the industry's association through Washington contacts with the Government and its agencies.

PRICE FREEZE—COST SQUEEZE

Especially important among the economic problems of the industry during the post-war era were the difficulties of the wage-price freeze of January 1951, caused by the dangers of inflationary pressures and the uncertainties of the Korean conflict.

As in the case of most other commodities, selling prices of soft drinks were frozen at their December 1950-January 1951 level. With costs of labor, materials, supplies, and other essentials constantly increasing, the pressure of such rising costs on the industry's price level of long standing, became a serious threat of the financial soundness of many of its businesses. Through the A.B.C.B. effort and the assistance of industry members serving on the official advisory committee to Government, the rigidity of the price freeze was modified substantially in July 1951, and suspended in November 1952. In February 1953, the price and wage freeze was revoked entirely. This then, allowed a return to the flexibility and freedom of competitive prices, and permitted members of the industry to undertake its readjustment of pricing levels. This has been a vital factor contributing to the industry record of advancement during the post-war years.

PROGRESS AND EXPANSION

The industry's operating problems following 1945 were not, of course, only those of materials and prices. As in other fields, changes occurred in the operation of the bottled soft-drink business and in the mechanical phases of its bottling plants. New personnel, required by revival of the industry's customary growth and expansion, was lacking in specialized knowledge concerning important phases of the business and technical aspects of the industry.

This gave reason for the A.B.C.B., during the early post-war years, to develop special texts and materials on job evaluation, aptitude

testing, sales training, and on the essential features of cost controls and profit planning.⁶ All of these subjects were discussed and illustrated at the annual meetings, and several series of conferences, or schools were held in various cities throughout the country.⁷ To these the members sent their personnel for instruction, and they were well attended. The technical schools, known as the Plant Training Course, have become an annual event.

TAXES AND SUGAR

The foregoing shows the wide scope of the association's service on behalf of the industry in its effort to expand and to progress. But that has been accompanied by the constant recognition that the association is the one means of effectively presenting industry's viewpoint when unjustified or discriminatory legislative or regulatory measures are proposed.

This is illustrated to a degree by the matter of ingredient labeling under the Federal Food, Drug, and Cosmetic Act of 1938, and the industry's early involvement in that problem due to its dependence upon the returnable bottle and the crown as its container and labeling medium.

Upon the petition of the association and its factual presentation, bottled carbonated beverages were exempted from ingredient labeling, by the Food and Drug Commissioner under authority of the Act, pending the preparation of standards for the industry's products. Possible loss of several millions of dollars to the industry, which would have resulted from an enforced discarding of bottles, was thus avoided.

Potential difficulties in application of the overtime provisions of Fair Labor Standards Act of 1938 to the driver-salesman was another threat. It was possible for the association to iron this out by an effective showing that the nature of his duties properly qualified the driver-salesman for the "outside salesman" exemption.

Another important illustration is provided by the early threats of the World War II period to again levy special taxes on the industry's products as a part of the Federal fiscal program.

In 1941 a tax of 1¢ per bottle was proposed in the Ways and Means Committee of the House of Representatives, but upon the association presentation of the industry's case against such an unjustified and uneconomic levy, the proposal was reduced to 1/2¢ per bottle, and passed. However, the revised proposal was eliminated by the Senate Finance Committee of the Senate, and the elimination accepted in conference. Similar proposals were made in the revenue plans of 1942 and 1943, but they were eliminated before the bills were introduced. Revenue plans for 1952 embodied the same threat of a soft drink levy, but it was again averted.

Since sugar has always been a vital raw material in the industry's processes, the enactment of a new Sugar Act in 1948 brought with it a series of recurring efforts by the industry and the association, to assure an adequate supply at fair price for soft drink bottlers and other sugar users.

The purpose of the legislation was to control the sugar supply so that destructive price conditions, and their adverse effect upon the domestic sugar industry would be avoided. Administration of the Act by the Secretary of Agriculture has frequently brought wide differences of opinion as to the proper price level, and as to the adequacy of the permitted supply quota influencing that level. Sugar producers tended to consider the new form of controls under the Act as a mandate for higher sugar prices, with the means of accomplishing that being increased restriction of the supply. Users, on the other hand, have contended for an ample supply, adequate to assure fair and reasonable prices from the standpoint of the user and consumer.

The result has been need for A.B.C.B.'s constant attention to the subject through the years, in common with other industrial user groups, with the conflicting viewpoints of sugar producer and user coming to a climax at the annual hearings preceding the setting of the supply quota for the following year.

THE CONVENTION AND EXPOSITION

Since the 1919 meeting of the National Bottlers' Association, at which the new association was organized and named the American Bottlers of Carbonated Beverages, meetings have been held each year, in various cities from the Atlantic to the Pacific, and from the Canadian border to southernmost points.

The annual convention⁸ of the A.B.C.B. provides its membership with a forum for discussion and consideration of matters of national importance to the industry, such as those outlined previously and many others. Three daily sessions are held, and have generally drawn an attendance of several thousand persons, representing member plants in all parts of the United States. Substantial numbers of visitors from the industry in foreign countries have not been unusual, for they wish to learn more of the American industry. Keynote addresses are given by industry leaders. Interest is added to the more formal aspects of the programs by addresses by legislators, government officials, economists, scientists, and others who bring to the assembled members their messages of importance to this segment of the American food products industry. And association officers and Executive Board for the succeeding years are elected by the membership.⁹

An exposition of bottling plant equipment and supplies was begun as an annual event under association auspices in 1921. Omitted only during the war years 1942 to 1946, inclusive, the exposition has been an important feature of the A.B.C.B. meeting program. The association's annual exhibit is recognized as one of the basic reasons for the rapid mechanical progress experienced by the industry during the years which followed its beginnings. Interest of the bottler in modern, economical equipment was sustained through these annual events, and a spirit of competition in the development of new and better machines by the equipment manufacturers has been fostered. About two hundred suppliers of machinery, equipment, vehicles, materials, and supplies and services of all kinds, usually participate.

THE STATE ASSOCIATIONS

The annual convention also provides the opportunity for a joint meeting of the officers of the state associations affiliated with the A.B.C.B. Such a meeting, designated the State Association Conference, has been held annually, and in some recent years has been supplemented by a mid-year conference in Washington. At these meetings, the functions and operations of the state associations in pursuance of their objectives are the primary items of the agenda. The Vice President of the national association is ex-officio the Chairman of the State Association Conference.

Principal functions of the state associations, of course, are related to discriminatory and unfair legislative proposals. In the earlier years the matter of encouraging regulation tending to promote a high degree of sanitation in soft drink bottling plant operation required attention, and most States adopted such laws with the approval and assistance of their state organizations.

In more recent years the burdens of unfair taxation have been a leading subject of consideration. This has been especially true regarding proposals by the State Governments to levy special taxes on the sales of soft drinks. Usually these proposals are to tax soft drinks 1¢ per bottle.

Since 1925 proposals of this nature have been made in virtually every State, and in some of them at practically every bi-ennial session of the legislature. The effectiveness of the state association in showing the unfairness and unsoundness of such levies is shown by uniform success which has attended their efforts. Only two States have such a tax.¹⁰

A.B.C.B. MEMBERSHIP

The important place held by the American Bottlers of Carbonated Beverages as the national association in the bottled soft drink industry is shown by its large membership.

All of the state associations, forty-seven in number, are affiliated with it as "association members." No dues or assessments are levied on the state associations in connection with the affiliation with the A.B.C.B. The state associations are supported by their own membership, comprising the bottlers in their respective areas. These affiliated organizations include:

Alabama Bottlers' Association	Delaware Bottlers' Association
Arizona State Bottlers' Association	Florida Bottlers of Carbonated Beverages
Arkansas Bottlers of Carbonated Beverages	Georgia Bottlers' Association
California and Nevada Manufacturers of Carbonated Beverages	Carbonated Beverage Manufacturers of Illinois
Colorado Bottlers of Carbonated Beverages	Indiana State Bottlers' Protective Association
Connecticut Manufacturers of Carbonated Beverages	Iowa Bottlers of Carbonated Beverages
Carbonated Beverage Mfrs. Association (District of Columbia)	Kansas State Bottlers' Association
	Kentucky State Bottlers' Association
	Louisiana Bottlers' Association

Maine Bottlers of Carbonated Beverages	Oklahoma Bottlers of Carbonated Beverages
Maryland Bottlers of Carbonated Beverages	Oregon Bottlers of Carbonated Beverages
Massachusetts Bottlers of Carbonated Beverages	Keystone Bottlers' Protective Association of Pennsylvania
Michigan Bottlers of Carbonated Beverages	Rhode Island Bottlers of Carbonated Beverages
Minnesota Bottlers' Association	South Carolina Bottlers of Carbonated Beverages
Mississippi Bottlers' Association	South Dakota Bottlers' Association
Missouri Bottlers of Carbonated Beverages	Tennessee Bottlers of Carbonated Beverages
Montana Bottlers of Carbonated Beverages	Texas State Bottlers' Association
Nebraska Bottlers of Carbonated Beverages	Tri-State Bottlers of Carbonated Beverages (Utah-Idaho-Wyo.)
New Hampshire-Vermont Bottlers of Carbonated Beverages	Vermont Bottlers of Carbonated Beverages
New Jersey Bottlers of Carbonated Beverages	Virginia Manufacturers of Carbonated Beverages
New Mexico Bottlers of Carbonated Beverages	Washington Bottlers of Carbonated Beverages
New York State Bottlers of Carbonated Beverages	West Virginia Bottlers' Association
North Carolina Bottlers' Association	Wisconsin Bottlers of Carbonated Beverages
North Dakota Bottlers' Association	Wyoming Bottlers' Association
Ohio Bottlers of Carbonated Beverages	

From the initial membership representing 600 bottling plants at the time of its organization in 1919, in 1957 the American Bottlers of Carbonated Beverages had a membership of almost 2,800 plants, in all States, and estimated to produce well above 90% of the bottled soft drinks sold in the United States. Its finances come from the dues paid by its members, varying from \$20 to \$350 per year, depending upon the productive capacity of the filling equipment used, and from funds provided by its 200 associate members in the supply fields.

Located in Washington since 1920, in 1942 the association acquired its own headquarters building at 1128 Sixteenth Street, Northwest, and which it has occupied since that time.

OTHER INDUSTRY ASSOCIATIONS

In addition to the American Bottlers of Carbonated Beverages and its affiliated State organizations, several other associations serve specific segments of the industry.

When A.B.C.B. was organized in 1919 the national shippers of ginger ale and mineral waters were affiliated in the National Mineral Water and Beverage Association, with traffic problems relating to transportation of their products as a major activity. The association ceased to function early in the twenties.

National Brands Soft Drink Institute was organized at the termination of World War II, and was active for a short period in post war problems relating to the particular field indicated by its name.

Other organizations are comprised of the bottlers of a specific franchised brand, or proprietary line. Bottlers of Coca-Cola for example, organized the Coca-Cola Bottlers' Association, in Atlanta, in 1914. Insurance and standardization are among its major activities.

Ralph B. Beach, of that city, has been Secretary of the association for many years.

For similar purposes and objectives, the Pepsi-Cola Bottlers' Association was formed in Chicago, in 1946. Arthur Hardgrave served as its Secretary until 1957; followed by Gerald H. O'Brien.

Technical men in the industry, including the bottling operation and the supply fields, organized the Society of Soft Drink Technologists, in Washington, in 1953. Its interests are directed toward assuring progress of the industry in its scientific and technical phases. Annual meetings are held. Harry Korab, of Washington, A.B.C.B. Technical Service Director, serves as its Secretary.

Manufacturers of their supplies and equipment used by the industry also have their associations. Oldest of these is the National Manufacturers of Beverage Flavors; John S. Hall, of Chicago, is Secretary and Counsel. The association was organized in 1905 as the National Manufacturers of Soda Water Flavors; the name was changed in 1953.

The Crown Manufacturers' Association was organized in 1925, with Louis B. Montfort, Washington, serving as its Secretary and Counsel until his death in 1945. Later organization is the Crown Manufacturer's Institute, Inc., organized in 1954 of which J. R. Gorman, Washington, is Secretary.

Machinery manufacturers in 1943 organized the Beverage Machinery Manufacturers' Association, for the representation of their specific interests. Its first president was Henry R. Bafetti, long identified with the industry organization activity as Vice President of the Liquid Carbonic Corporation. Membership comprises the major producers of equipment used in the bottling plants of the Twentieth Century. John Marshall is its Secretary, with headquarters in Washington.

Also closely allied with soft drink industry interests have been effective organizations representative of the bottle manufacturers' interests. The first of these, the Glass Container Association, was organized in 1919, and dissolved in 1945. Later that year, the Glass Container Manufacturers' Institute was organized by the bottle producers. Active in matters relating to glass production and its problems, its functions also have included extensive promotion and advertising of products in glass, including soft drinks. Victor L. Hall is its General Manager, headquarters are in New York City.

SUPPLEMENTARY NOTES TO THE CHAPTERS

Notes to Chapters of the Text

CHAPTER 1

1. [THOMAS HENRY] Kirkby cites: "An account of a Method of Preserving Water at Sea, to which is added a Mode of Impregnating Water in large Quantities with Fixed Air. For the Use of the Sick on Board of Ships and in Hospitals," by Thomas Henry, F.R.S., Warrington, 1781.

2. [FLAVORINGS] Indicative of the early European trend, the 1809 British patent to William F. Hamilton made reference to "vegetable acids, aromatic oils" and sugar in the composition of "various solutions" for flavoring aerated waters. And then there was the British patent for "saccharine waters" granted to Bakewell about 1832.

3. [PHARMACOPOEIA] In *Frontiers of Medicine* (Baltimore, 1933), p. 179, Dr. Morris Fishbein reports that the first American Pharmacopoeia was published in Philadelphia in 1778 by William Brown.

4. [SODA WATER] Quoting the *Journal of the Franklin Institute* (1831) "... it would appear that the patent supposes that what is usually called soda water, is prepared from those two ingredients, whilst the fact is that neither of them ordinarily, enters into its composition; the so called soda water, being merely water impregnated with carbonic acid. The liquid in question is one form of the well known effervescing mixture of the physician; citric acid, however, being more commonly used for this purpose . . ."

5. [FIRST FLAVORINGS] In *Beverages, Past and Present*, by Edward R. Emerson (2 vols., New York, 1908), the author of that extensive work relates the early origins of the common beverages in all parts of the world. He offers the following comment on the origin of flavor in soda water: "... The desire to render the water more palatable was only the instinctive outcome of the dislike the majority of people have for pungency, and the use of syrup flavoured or plain naturally followed. Unfortunately neither history nor legend tells us when this occurred and to enter upon the field of speculation would be to invite criticism that would not repay the trouble" (Vol. 2, p. 475).

CHAPTER 2

1. [EARLY STUDIES] For a more complete discussion of the early investigations and their writings on mineral waters and carbon dioxide, refer to *Scientific and Medical Origin of Carbonated Waters*, by John J. Riley (A.B.C.B., Washington).

A particularly helpful reference for summarized biographical data on early European and American scientists, is *A Universal Biographical Dictionary* (published by Normal White, Richmond, Va., 1826). There were issues of this book by other publishers. Also see *Appleton's Cyclopaedia of Biography*, by Francis and Charles Hawks, Ed. (New York, 1865 and later editions).

2. [BERGMAN] *Torbern Bergman as Pioneer in the Domain of Mineral Waters*, by Uno Boklund; also includes Bergman's papers "On Acid of Air" (1773) and "Treatise on Bitter, Seltzer, Spa and Pyrmont Waters and Their Synthetic Preparation" (1775), in English (Almquist & Wiksell, Stockholm, 1956). The papers of Bergman, in full facsimile, and the biographical data by Boklund, were published in 1956, in Swedish, also.

Torbern Bergman: A Bibliography of his Works, by Birgitta Mostrom (Almquist & Wiksell, Stockholm, 1957).

3. [JOSEPH PRIESTLEY] A full facsimile of Priestley's *Directions for Impregnating Water with Fixed Air, In order to communicate to it the peculiar Spirit and Virtues of Pyrmont Water*, with preface "Priestley and Carbonated Waters," by John J. Riley, was published by the American Bottlers of Carbonated Beverages (Washington, 1945).

4. [NOOTH DEVICE] Devices such as that of Nooth later became known by the generic term "gazogene"; "seltzogene" was sometimes used. Improved types of the Nooth device, and some variations also classed as gazogenes were quite commonly used during the years of the 1800's. French types were particularly popular, among which were those made by Briet, Bocquet, Villiet, Veissiere, Guerin, Rousselle and Fancelin.

CHAPTER 3

1. [EUROPEAN] The digest of European developments here presented was developed from a wide range of sources, including scattered items in the trade literature over a period of many years. Generally, however, it follows the outline of *Evolution of Artificial Mineral Waters*, by Kirkby (Manchester, England, 1902), and "A Brief History of Soft Drinks," by George B. Beattie (*Soft Drinks Trade Journal*, February 1953-October 1954; London).

2. [NICHOLAS PAUL] Twentieth century letterheads of N. Paul & Co., Ltd., London, bear the notation "Established in Geneva as Paul, Schweppe & Goss in 1799, and in London as N. Paul & Co., and later in Bow Street as Paul & Burrows in 1802. The Oldest Firm of Mineral Water Manufacturers in the World."

3. [THWAITES] See article "Did the Irish Invent Soda Water," reprinting letter from A. & L. Thwaites & Co., Ltd., Dublin, Ireland (p. 73, *National Bottlers Gazette*, June, 1957).

4. [STRUVE] During the Twentieth Century the Leipzig and Dresden factories started by Struve were still in operation, the business conducted by descendants of the founder. The London business of Struve was established in 1847 by his agent William Hooper, dealing in sweetened drinks. Hooper, Struve & Co., Ltd. are still in business in London.

5. [SIPHON] For a more detailed development of the siphon bottle, Kirkby's *Evolution of Artificial Mineral Waters*, should be consulted.

6. [CODD PATENT] Essential features of the Codd ball-stoppered bottle are shown in U.S. Patent No. 138,230 (April 29, 1873); filed January 21, 1873, issued to Isaac Codd, of Camberwell, England, assignor of one-half to Richard Barrett, of London.

7. [EXHIBITION HISTORY] From Vol. 1, *A Concise History of the International Exhibition of 1862*, by John Hollingshead (London, 1862).

8. [EUROPEAN PERIODS] Beattie, in his "Brief History of Soft Drinks" reports French sources that list these periods of European mechanical development of the industry: Experimental 1560-1799; Early Development 1799-1832; Industrial Development 1832-1860. Applicable to Britain, Beattie states his conclusion as to the periods: Early Experimental to 1774; Transitional 1774-1802; Early Development 1802-1820; Industrial Development 1820-1860.

CHAPTER 4

1. [REFERENCE] As in the discussion of the early European studies regarding the artificial carbonation of waters the author has here drawn heavily on his prior *Scientific and Medical Origin of Carbonated Waters*, published by the American Bottlers of Carbonated Beverages (Washington, 1946, 1947, 1948, 1957).

2. [DR. BENJAMIN RUSH] Rush has been given credit for producing the first American text on chemistry—*A Syllabus of a Course of Lectures on Chemistry*, Philadelphia, 1770. Of incidental interest connected with Rush's attention to mineral waters may be his similar concern with the effects of alcohol. His treatise on the toxicity into the effects of ardent spirits upon the human body and mind, with an account of the means of preventing and some of the remedies for curing them, went into several editions.

3. [SARATOGA AND BALLSTON] In addition to the studies given to making the artificial effervescent waters, which became the objective of Silliman and others mentioned from this point on, the medical-scientific studies of naturally carbonated waters at Saratoga and Ballston continued throughout the 1800's. A few of those making such studies and observations may be mentioned.

In 1807 Robert L. Livingston, having taken a sample of Ballston water to France, and had it analyzed, corresponded on the subject with Dr. David Hosack, the eminent New York physician and Professor of Botany and Materia Medica at Columbia College. Dr. Hosack became intrigued, and in 1810 published this correspondence concerning the waters in the American Medical and Philosophical Register, which he edited, with further comments based upon his own studies. Further correspondence of Hosack on the subject also was published in the *Medical Repository* in 1808, of which Dr. Samuel L. Mitchill was an editor, and in *The Monthly Anthology and Boston Review* during the same year. It was this published correspondence which initiated the controversy by Seaman, referred to in this chapter, and which is outlined in full by Dr. Henry E. Sigerist, in "The Early Medical History of Saratoga Springs" (*Bulletin of the History of Medicine*, May 1943, Baltimore).

Dr. Seaman's second treatise on the Saratoga waters was reviewed at length in the 1809 volume (pp. 286-290) of the *New York Medical and Philosophical Journal and Review*, resulting in further controversy on the subject which was published in 1809-1810 volume of the *Medical Repository*, and in the 1810 volume of the *Review*.

This interest in the natural mineral waters continued throughout the 1800's. Earliest and long in this field was Dr. John H. Steel, a Saratoga practitioner who in 1817 published his first observations on the mineral waters of Saratoga and Ballston. Numerous other editions followed, beginning in 1819, and until 1860.

During the same period many other medical discussions of the Saratoga and Ballston waters were published, including books by Dr. John Meeker (New York, 1815); Dr. William Meade (Philadelphia, 1817); and Dr. John Bell (Philadelphia, 1831 and 1855).

Other writers later in the century included Dr. J. J. Moorman (*Mineral Waters of the U.S. and Canada*; Baltimore, 1867); Dr. G. E. Walton (*Mineral Springs of the U.S. and Canada*; New York, 1873); and Dr. James K. Crook (*Mineral Waters of the U.S. and their Therapeutic Uses*; Philadelphia, 1899). Much material concerning Saratoga and its waters, including writers on the latter, is included in *Reminiscences of Saratoga*, by William L. Stone (New York, 1875).

More recently, the general subject has been covered in a series of articles by the late Dr. Sigerist, including "American spas in historical perspective" (*Bull. Hist. Med.*, February, 1942), "European spas through the centuries" (*Ciba Symposia*, Vol. 8, pp. 308-312, April-May, 1946), "Rise and fall of the American spa" (*Ibid.*, pp. 313-326), and "Towards a Renaissance of the American spa" (*Ibid.*, pp. 327-336).

4. [JOSEPH PRIESTLEY] Dickinson College (founded 1773) of Carlisle, Pennsylvania, has long been interested in Joseph Priestley and his contributions to the development of chemical research and teaching in the United States. Through Thomas Cooper, distinguished member of the Dickinson faculty in the early 19th Century, most of the apparatus belonging to Joseph Priestley, during his Northumberland period, became the property of Dickinson College and has been cherished by the College as a tangible link with the discoverer of oxygen. Included among such items of the collection are the double burning glass, and such other pieces of apparatus as the Priestley reflecting telescope, and his refracting telescope, his demonstration air gun, and some of Priestley's laboratory glassware.

The Priestley Museum in Northumberland, Pennsylvania, is another American source of material on Priestley; some of the book and manuscript material of the museum has been moved to Pennsylvania State University at University Park, Pennsylvania for safe keeping. Bucknell University, at Lewisburg, Pennsylvania also has a collection of Priestleyana.

The Edgar Fahs Smith Memorial Collection in the History of Chemistry, at the University of Pennsylvania, Philadelphia, also includes many Priestley items among

its extensive collection of material relating to the early history of chemistry in America.

5. [CLOUD; PATTERSON] This was probably Joseph Cloud, also with the Mint in Philadelphia, for many years as melter and refiner; he was a chemist, and friend of Patterson and Robert Hare.

Robert Patterson (1743-1824) was professor of mathematics at the University of Pennsylvania from 1779 to 1814, was a frequent contributor to the scientific publications of the American Philosophical Society (of which he was President in 1819), and in 1806 published a work of 2 volumes entitled *Lectures on Select Subjects in Mechanics*. In 1805 he was appointed by President Jefferson as Director of the U.S. Mint, in Philadelphia, where the experiment here referred to is reported to have taken place. Rush and Rittenhouse were also connected with the Mint.

6. [ACCUM] Frederick Accum (1769-1838), of London. Accum's books were reprinted in Philadelphia. The second American edition of *System of Theoretical and Practical Chemistry*, with appendix by Cooper, appeared in 1814. The second American edition of *Chemical Amusements*, with additions by Cooper, was published in 1818. One of the earliest books of its kind was Accum's *Treatise on Adulterations of Food, and Culinary Poisons*, which was published also in Philadelphia in 1820.

7. [SIMONS; MONCREIFF] This may establish a connection between the interest of Simons in carbonated waters and that of John Moncreiff, apothecary of Edinburgh, and author of the booklet published there in 1794 on *Medicinal Qualities and Effects of Aerated Alkaline Waters*. It was re-published in Baltimore in 1810. Although spelled differently, the Moncreiff genealogy includes Robert Moncreiff, born in 1753, and brother of John Moncreiff; also another, Archibald, born in 1751, died unmarried in Baltimore, in 1803. See *The Moncreiffs* (Edinburgh, 1929).

CHAPTER 5

1. [SILLIMAN] See *Benjamin Silliman, 1779-1864, Pathfinder in American Science*, by John F. Fulton and Elizabeth H. Thomson (New York, 1947). Silliman himself fixes March, 1807 as the time of his "having been concerned in the introduction of soda water, into this country" in an obscure note to his "Remarks on Soda Water," p. 381, Vol. 1, *Elements of Chemistry* (New Haven, 1830).

2. [EARLY PHARMACY] For a comprehensive discussion of early druggists and the early days of pharmacy in Philadelphia, see *The First Century of the Philadelphia College of Pharmacy*, by J. W. England (Philadelphia, 1922). Also see *History of Pharmacy*, by Edw. Kremers and Geo. Urdang (Philadelphia, 1940).

3. [GLENTWORTH] *Emporium of Arts and Sciences*, Thomas Cooper, Ed. (Vol. 3 New Series; Philadelphia, 1814).

4. [SPEAKMAN; HART; HAWKINS] Townsend Speakman (1743-1793), Philadelphia druggist, is frequently mentioned in trade literature as the originator of flavored carbonated beverages in the United States. The earliest reference on this subject found, after careful search, appeared in *The National Soda Fountain Guide* (St. Louis, 1913, William S. Adkins, Editor), in which the year 1807 is given as the approximate time, and it merely indicated that Speakman may have made artificial mineral waters at that time; it did not mention flavored drinks. But Speakman died in Philadelphia during the yellow fever epidemic of 1793 (September).

Neither is it likely that Speakman furnished medicines to the Revolutionary Army, as occasionally reported. Speakman "refused to take sides in the struggle, or to join in war measures of any kind," according to the family history, and his refusal to accept Continental paper money resulted in his shop being sealed by the authorities (see *The Speakman Family in America*, by Emma Speakman Webster, Philadelphia, 1930).

Speakman emigrated to America from England in 1771, and in October 1771, engaged in the drug business at No. 8 South Second Street in Philadelphia. In 1782, John Hart was bound to him as an apprentice and, one year after Speak-

man's death, married the latter's daughter, Lydia Speakman. Hart operated the Speakman shop for several years. It was still operating in Philadelphia in 1880, proprietor E. H. Kaercross, at No. 8 (renumbered No. 24) South Second Street.

Westcott's *History of Philadelphia* (Chapter DCXLIV, in the Philadelphia Sunday Dispatch of August 17, 1879, page 1) has been cited as authority for crediting John Hart as the first to manufacture artificial mineral waters in Philadelphia; an error. Westcott clearly credits Hawkins with that, although he names Hart among the first of Philadelphia apothecaries to engage in the making of such waters, probably about 1809, or soon after Hawkins introduced the product. Ward made that error, and then retracted (see "South Second Street and its Associations," by Townsend Ward, in *The Pennsylvania Magazine*, Philadelphia, 1880, Vol. 4; p. 57, cf. p. 410).

The report that Hart made the fountain type of artificial mineral waters during his operation of the Speakman shop is creditable; others in the city started doing it about that time. However, credit to Hawkins as the first in Philadelphia to make the product for public sale is further supported by the earlier report in *A History of American Manufactures (1688-1860)*, by J. Leander Bishop (Philadelphia, 1861).

In view of the foregoing, it is equally obvious that Dr. Philip Syng Physick (1768-1837) sometimes mentioned as the one who encouraged Speakman to flavor artificially carbonated waters about 1807, could not have done that. In 1789, at the age of 21, Physick was sent to London to complete his medical education, and did not return to Philadelphia until September, 1792, where he soon became engaged with Dr. Rush in the difficult work of combating the yellow fever during the epidemic of 1793. Dr. Physick was then 25 years old; Speakman was 50.

Dr. Physick was associated with Hawkins, in 1807. According to Westcott, both Dr. Benjamin Rush and Dr. Physick provided Hawkins with certificates of the efficacy of his product. Dr. Physick, in that same year was one of the "inspecting physicians" for the Mineral Water Association, a company of stockholders organized in Philadelphia by Hawkins in October, 1807, to finance the mineral water business he had started a few months earlier.

Westcott's series of newspaper articles in the *Philadelphia Dispatch* on the "History of Philadelphia" were followed later by a book of that same name (by Thompson Westcott and John T. Scharf; Philadelphia, 1882).

5. [THOMAS SAY] See *Men of Science in America*, by Jaffe (New York, 1944). Also *Thomas Say, Early American Naturalist*, by Weiss and Ziegler (Baltimore, 1931).

6. [SODA POWDERS] Popularity of powders of this kind persisted through the 1800's, and well into the 1900's, such as the well-known "Seidlitz" powders. Many of the present day powders and pills for making simple effervescent palliatives follow the same principle. On April 17, 1849, Patent No. 6333 was issued to Solomon Andrews and J. F. Halsey, of Perth Amboy, N. J., covering the preparation of tartaric acid and super-carbonate of soda, in metallic capsule form. John Matthews, of New York City, was issued Patent No. 129,044, on July 16, 1872, for mineral water salts in tablet form.

7. [JOHN CLARKE] See *Reminiscences of Saratoga and Ballston*, by William L. Stone (New York, 1875); also p. 85, *Such was Saratoga*, by Hugh Bradley (New York, 1940).

8. [EUGENE ROUSSEL] *The Soda Fountain Industry*, by Louis A. Becker (The Pharmaceutical Era, New York, 1913).

CHAPTER 6

1. [SODA WATER PATENTS] In 1831, for example no less than six patents were issued for mixtures, or for the devices for mixing soda and tartaric acid to produce soda water. Patentees included: Dr. William Mead, Newburgh, N. Y. (April 11, 1831), Justus Perkins, Brutus, N. Y. (May 3, 1831), Alonzo L. Smith, Brutus, N. Y. (June 13, 1831), John Ambler, Jr., New Berlin, N. Y. (June 13, 1831), Ambrose Church, Canandaigua, N. Y. (July 20, 1831), and Noah H. Coleman, Mentz, N. Y. (July 20, 1831). The Ambler device is the only one of these

for which an illustration is available; Patent Office records were destroyed by fire in 1836.

2. [FOUNTAIN PATENTS] Patent (December 23, 1824) to Joseph H. Laning, of Davidson Co., Tennessee, charging liquids with gas. Patents to Joseph Boston, New York, N. Y. (May 5, 1832), and to Joseph Boston and T. Bryant, New York, N. Y. (April 11, 1836), for soda fountain devices.

3. [FOUNTAIN PATENTS] Patent No. 995 (November 3, 1838) to Lansing B. Swan, Rochester, N. Y. for mineral water soda fountain. Swan's Patent Atmospheric Soda Fountain or Mineral Water Apparatus, price \$60, was widely used; A. B. & D. Sands, Druggists, 100 Fulton Street, New York City, were his agents. Patent No. 1278 (August 9, 1839) to Lemuel B. White, Cincinnati, Ohio, was for a portable soda fountain.

4. [FRANKENBERG PATENT] Patent No. 10,337 (December 20, 1853) to Alexander Frankenberg, Columbus, Ohio, for a soda water fountain.

5. [NICHOLS PATENT] Patent No. 11,384 (July 25, 1854) to James R. Nichols, Haverhill, Mass., for a combined generator and portable soda fountain. His patent No. 16,549 (February 3, 1857) was for a fountain syrup apparatus, under pressure.

6. [FAHNESTOCK PATENT] Patent (April 23, 1819) to Samuel Fahnestock, Lancaster, Pa., for a mineral water apparatus, or soda fountain. In his device, Fahnestock enclosed a stoneware vessel within a copper tinned vessel, each having an opening at its top. Water contained in the one vessel, and in the space between the two vessels, was then impregnated with the carbonic gas, but since the inner vessel was completely under pressure within the outer metal tank, it was not susceptible to breakage. A silver siphon tightly closed the opening of the outer tank and on the interior extended into the inner vessel, thereby permitted only the carbonated water in the latter to escape when the siphon valve was opened. Removal of the siphon and inverting of the fountain permitted the water between the two vessels to be discarded, after which it was recharged.

7. [COUGHLAN PATENT] Patent No. 10,167 (October 25, 1853) to William Coughlan, Baltimore, Md., for a soda fountain. Patent No. 58,608 (October 9, 1866) was issued to him for an improved fountain.

8. [MATTHEWS PATENTS] The senior John Matthews was active in the early soda fountain trade since 1832, but left no record of his accomplishments in the development of apparatus, as no patents in that field were issued in his name. The junior John Matthews, after mid-century, was active in the development of soda fountain apparatus, although his major interest centered in the bottling field, as outlined in the succeeding Chapter. His patented devices included—syrup cooling and draught apparatus for soda fountains, Patents No. 50,255 (October 3, 1865); No. 125,139 (April 2, 1872); No. 125,591 (April 9, 1872); No. 151,895 (June 9, 1874); syrup receptacles for fountains, Patents No. 96,823 (November 16, 1869); No. 138,671 (May 6, 1873); No. 141,154 (July 22, 1873); No. 231,921 (September 7, 1880); draft arms and faucets, Patents Nos. 128,410 (June 25, 1872); No. 141,229 (July 29, 1873); soda fountain construction, Patent No. 179,584 (July 4, 1876); several of his patents related to the portable type of steel fountains (tanks). A novel type of counter fountain is shown by his Design Patent No. 13,011 (June 27, 1882).

9. [HINDERMYER FOUNTAIN] The Hindermeyer urn-fountain of 1860 was an improvement of a previous device; syrup containers and faucets were added. See Design Patent No. 876 (March 24, 1857) by Joseph Bernhard, of Philadelphia. Hindermeyer was one of the assignees. He later patented a fountain of his own invention, No. 40,496 (November 3, 1863).

10. [BIGELOW PATENTS] Patents of Edmund Bigelow, Springfield, Mass. included Patent No. 22,697 (January 25, 1859) for a soda water-syrup cooling and draft apparatus, and No. 51,130 (November 18, 1865) for a soda water cooler. Bigelow also patented early fountain designs, covered by Design Patents No. 3509 and No. 3510 (June 1, 1861). His firm, the Bigelow Manufacturing Company, was later taken over by John Matthews.

11. [MORSE PATENTS] Patent No. 44,645 (October 11, 1864) to Andrew J. Morse, Ambrose, Mass., for a syrup fountain and cooler, with gauge. Patent No. 91,960 (June 29, 1869), Andrew J. Morse, Boston, Mass., was for a glass syrup

holder, such as used in the foregoing. An early type of fountain design was patented by Morse, Design Patent No. 3959 (April 5, 1870).

12. [GEE PATENTS] Gee's horizontal generator was covered by Patent No. 13,057 (June 12, 1855); his force pump and fountain by Patent No. 34,826 (April 1, 1862); and his improvement in valve for gas generators by Patents No. 49,871 (September 12, 1865 and No. 183,454 (October 17, 1876). Later patents on generators included No. 183,455 (October 17, 1876) and No. 187,614 (February 20, 1877). He also patented a bottle filler, Patent No. 184,608 (November 21, 1876). His Patent No. 38,577 (May 19, 1863) covered a two-stream soda water valve for soda fountains, and would appear to be the earliest in that field. There were many others relating to syrup dispensing at soda fountains.

13. [DOWS PATENTS] Patents to Gustavus D. Dows, Lowell, Mass. included: No. 33,880 (December 10, 1861) for a soda water apparatus and ice-shaver combined, No. 42,078 (March 29, 1864) for a soda fountain draft tube, and No. 99,170 (January 25, 1870) for a portable fountain with internal mixing plate. Dows has sometimes been credited with the invention of the first double-stream soda draft tube for soda fountain use, Patent No. 42,078, but the validity of such claim may well be disputed by U.S. Patent issued to William Gee on May 19, 1863, No. 38,577. It describes the purposes and objectives of such a device, and illustrates the mechanism of the valve for providing a sharp stream, or a large stream, selectively.

14. [PUFFER PATENTS] Puffer's first patented invention in the field was called the "Magic" draft tube, Patent No. 33,796 (November 26, 1861). Most of his other patents also related to soda fountains, viz., cooling devices, Patents No. 39,587 (August 18, 1863), No. 109,942 (December 6, 1870), No. 189,137 (April 3, 1877); cabinets, Patents No. 104,881 (January 28, 1870, No. 255,456 (March 28, 1882); portable fountains, Patents No. 139,734 (June 10, 1873), No. 465,049 (December 15, 1891); syrup can arrangements, Patents No. 415,883 (November 26, 1889), No. 418,223 (December 31, 1889), No. 435,188 (August 26, 1890). Gas generator devices included Patents No. 275,076 (April 3, 1883), No. 300,007 and No. 300,008 (June 10, 1883), and a cradle type carbonator was covered by Patent No. 347,378 (August 17, 1886). He also invented an early type of tumbler-washer, Patent No. 174,090 (February 29, 1876). An innovation was his syringe device for use of soda water in surgery, covered by Patent No. 94,029 (August 24, 1869).

15. [TUFTS PATENTS] Early patents to Tufts as inventor, and relating to syrup can arrangement in the soda fountain, and syrup-soda water cooling, are Patents No. 98,445 (December 28, 1869) and No. 136,345 (February 25, 1873). His "cottage style" of fountain was covered by Design Patent No. 3465 (April 27, 1869); another by No. 3959 (April 5, 1870). A hot soda water fountain is illustrated by Patent to Tufts and Conrad Adami, No. 453,872 (June 9, 1891). The tumbler washer was covered by Bate Patent No. 256,193 (April 11, 1882), and McQuaide Patent No. 386,256 (July 17, 1888). In the later years Tufts relied largely upon others for improvements in the devices he promoted. These included numerous design patents on soda fountains issued to George F. Meacham, Frank H. Shepherd, William Cybea, and Mortimer L. Smith. Also mechanical patents issued to John Brown, W. P. Clark, W. H. Bates, J. F. McQuaide, F. J. Johnston, and others. Brown and Johnston were joint patentees of a bottling machine sold by Tufts, Patent No. 363,504 (May 24, 1887).

16. [INTERNATIONAL EXPOSITIONS IN U.S.] The soda water dispensing concession at the World's Fair Columbian Exposition in Chicago, in 1893, was acquired by a syndicate incorporated as the World's Fair Columbian Exposition Soft Drink Company. It, in turn, awarded the concession to Charles Lippincott & Co. of Philadelphia, for \$150,000. Estimated attendance at the Exposition was 1 million persons.

Other International Expositions held in the United States following the Columbian Exposition in Chicago, of 1893 were: Buffalo (Pan American), 1901; St. Louis (Louisiana Purchase), 1904; San Francisco (Panama Pacific), 1915; Chicago (Century of Progress), 1933-4; New York City (World's Fair), 1939. Carbonated Beverages, in bottles and at soda fountains, were displayed and sold at all of these events.

17. [LIPPINCOTT PATENTS] The name of Charles Lippincott does not appear among the prolific inventors in the soda water field. Design Patents were issued

to him during the early days of the marble fountain, including No. 5826 (April 30, 1872), and Nos. 6541-2-3 (March 19, 1873). In 1887 Patent for a soda fountain with removable syrup jars was issued to F. H. Lippincott, No. 375,452 (December 27, 1887).

18. [FOUNTAIN DESIGNS; SOURCE] Copies of the design patents on soda fountains, on file at the United States Patent Office, present a comprehensive outline of the development of the ornate marble fountains of the later years of the 1800's. Photographs of the fountains embodying the novel designs accompanied and were made part of many of the applications for design patent. It would appear to be a neglected mine of information on the subject. Early catalogues of Matthews and Tufts also are a source of illustrations of early soda fountains; they show many. Prominent among the early patentees appear the names of Bernhard, Tufts, Bigelow, Morse, Meacham, Lippincott, and Matthews. Charles E. Hires, root beer manufacturer of Philadelphia, was one of the early patentees of a soda fountain design (Des. No. 11,699, dated March 23, 1880). It embodied the form of a rustic house, covered with roots and vines.

19. [SODA FOUNTAIN HISTORY] For a more extensive historical discussion of the soda fountain field, extending into the Twentieth Century, reference is made to *History of the Soda Fountain Industry*, by Carl J. Palmer, Executive Secretary of the Soda Fountain Manufacturers Association, published in 1947.

Tufts wrote an extensive item on the origin of soft drinks and the soda fountain during the Nineteenth Century, which appears in *One Hundred Years of American Commerce, 1795-1895*, (D. O. Haynes & Co., New York, 1895), Vol. II, p. 470.

See also series of articles by Louis A. Becker, on "The Soda Fountain Industry," in *The Pharmaceutical Era*, issues February-June, 1913. These were later combined in a separate publication under the same title, published in 1913.

20. [CENSUS REFERENCE] Table 225, Abstract of Census of Manufactures, 1919; Table 1, Vol. II, 1947 Census of Manufactures; U.S. Bureau of the Census, Washington.

CHAPTER 7

1. [MATTHEWS PATENTS] The various patents issued to John Matthews, Jr. cited herein do not represent the complete list of the Matthews' patents, of which there were scores. It will be noted that the earlier patents were issued in the name of John Matthews, Jr., while in later years they were issued to John Matthews. Both groups relate to the same person; Matthews dropped the "Jr." in his patent applications in the later years.

2. [VANDER WEYDE] Examples of patents issued to Dr. Peter H. Vander Weyde include No. 88,348 (March 31, 1867) covering the use of soda water for medicine, combining "laughing gas" with soda water for its slightly intoxicating effect, and as an anaesthetic. John Matthews, Jr. was joint patentee. See also Patent No. 74,175 (February 4, 1868) for aerated liquids.

3. [MATTHEWS CATALOGUES] The Library of Congress (Washington) has catalogued the Matthews catalogues for 1860, 1864, 1867-9, 1871-2, 1873, 1874, 1875, 1876, 1877, 1879, 1882-3, and 1891. The A.B.C.B. files contain several of the later years of that period.

4. [FOUNTAINS] Patent No. 42,587 (May 3, 1864) to John Matthews, Jr., New York, N. Y., for improvement in soda-fountains; Patent No. 69,986 (October 22, 1867) to William Gee, New York, N. Y., for improvement in lining soda-fountains, in which tin-lined portable fountains were electroplated with silver.

5. [MATTHEWS PATENTS] The improvement of steel fountains with tin lining was covered by the Matthews Patent No. 128,411 (June 25, 1872). The wagon for transporting them was covered by Patent No. 125,592 (April 9, 1872). In 1875 another series of patents covering the lining of steel fountains with glass, and for strengthening their construction, was issued to John Matthews, Patents Nos. 159,431-2-3 (February 1, 1875).

6. [INTERNATIONAL EXHIBITIONS] The principal International Exhibitions, under various names, during the 1800's were—London, 1851; New York, 1853; Paris, 1855; London, 1862; Paris, 1867; Vienna, 1873; Philadelphia (Centennial), 1876; Paris, 1878; Paris, 1889; Chicago (World's Columbian), 1893; Paris, 1900.

CHAPTER 8

1. [GEE PATENTS] Patent to William Gee, New York, N. Y., No. 13,057 (June 12, 1855), for a Soda Water Generator. See also No. 34,826 (April 1, 1862) for Improved Soda Water Apparatus; No. 38,577 (May 19, 1863) for Improvement in Apparatus for Drawing Soda Water; No. 49,871 (September 12, 1865) for Improved Method of Constructing the Acid Chambers of Soda Water Apparatus. Patent to J. F. Boynton, Syracuse, N. Y., No. 15,838 (October 7, 1856), for a Soda Fountain.
2. [CARBONATING] Sulz's *Treatise on Beverages* (New York, 1888), Chapters X-XIV, provides a very comprehensive discussion of the various types of systems, and equipment used in the United States and in several European countries.
3. [MATTHEWS CARBONATOR] The Patent to Matthews, No. 68,375 (September 3, 1867) related to an Improved Apparatus for the Manufacture of Soda Water, and for Aerating Liquids. See Journal of the Franklin Institute, for October, 1868 (p. 218).
4. [BOTTLING TABLES] Patent No. 11,281 (July 11, 1854) was issued to Thomas W. Gillette, of New Haven, Conn. (John Matthews, assignee), covering an apparatus for corking bottles; a safety screen. Its illustration of general features of the bottling table would indicate earlier use of that type of mechanical device in the trade. The bottling table, per se, was not covered by this patent.
5. [MATTHEWS-CARSE PATENTS] Safety bottle guards for the filling operation were covered by Patent No. 41,082 (January 5, 1864) to John Matthews, Jr., New York, N. Y., and Patent No. 84,795 (December 8, 1868) to Henry Carse, Pittsburgh, Pa.
6. [COUNTER-PRESSURE] Patent to John Matthews, Jr., New York, N. Y., No. 53,019 (March 16, 1866), for Improved Apparatus for Bottling Liquids, is described by him: "My invention is designed to prevent waste of gas; and it consists in so constructing the apparatus that the air which is expelled from the bottle by the entrance of the liquid, together with any quantity of gas that may pass out therewith, are conducted into the reservoir or fountain which contains the liquid to be bottled, the air from the bottle taking the place of the liquid drawn from the reservoir or fountain to fill the bottle, and maintaining a more constant pressure in and upon the liquid therein."
7. [COUNTER-PRESSURE; ORIGIN] Beattie, in his "Brief History of Soft Drinks" (Soft Drinks Trade Journal, October, 1953) credits Savarese, early French pioneer in development of the siphon bottle, as the originator of the counter-pressure system of bottle filling, covered in his British Patent No. 7899 (December 6, 1838, through Berry). Use of counter-pressure as between two vessels containing soda water is mentioned in Br. Patents to Grant, No. 3805 (April 27, 1814); Struve (through Swaine), No. 4851 (October 9, 1823); and Bakewell, No. 6238 (March 8, 1832).
8. [MATTHEWS PATENT] Patent No. 61,627 (January 29, 1867) to John Matthews, Jr., New York, N. Y., for an improvement in bottling machines, covered the height-adjustable bottle rest; also an improved type of bottle-screen, or guard.
9. [SYRUP GAUGE; PUTNAM] Patent No. 33,602 (October 29, 1861) to Henry W. Putnam of Cleveland, Ohio, for an improved apparatus for filling bottles, covered his syrup gauge. See also Patent No. 43,344 (June 28, 1864) to John Schrink, Toledo, Ohio, for somewhat similar application of the principles of the Putnam device.
10. [SYRUP GAUGE; MATTHEWS] Patent No. 84,836 (December 8, 1868) to John Matthews, Jr., New York, N. Y., for an improvement in bottle filling apparatus. Also see Sulz, page 340. Patent No. 14,368 (March 4, 1856) to A. Quantin, Philadelphia, Pa., for a type of syrup gauge attached to the bottle filling head, and operated alternately with the carbonated water valve, involved mechanical features which differed from the Putnam and the Matthews gauges, but seems to have had the same general purpose, and was much earlier.
11. [FILLER; MATTHEWS] Patent No. 50,832 (November 7, 1865) to John Matthews, Jr., New York, N. Y. for improved apparatus for filling bottles.
12. [FILLER; ALBERTSON] Patent No. 44,685 (October 11, 1864) to Albert Albertson, New York, N. Y. for a turn-over filler for internally stoppered bottles.

CHAPTER 9

1. [SCANNELL PATENTS] Patent to Roger F. Scannell, of Boston, Mass., No. 300,019 (June 10, 1884), for an Agitator Device for Carbonizing Liquids. On the same date Scannell also received Patent No. 300,018, for Gasometer for Washing Carbonic Acid Gas received from the generator and as surplusage from siphons being filled (previously lost in snifting).
2. [ROBERTSON PATENT] Patent protection was claimed by Witteman Brothers, New York, N. Y., later proprietors of the American Apparatus Works, under U.S. Patent to Harry Robertson, N. Y., No. 351,126 (October 19, 1886), for Apparatus for Making Carbonated Beverages; he previously patented it in England, Br. Pat. No. 2565 (February 25, 1885).
3. [CARBON DIOXIDE] Primary sources of historical data mentioned here on development of liquefied carbon dioxide are *The Carbonic Acid Industry*, by J. C. Goosmann (Chicago, 1906), and *Carbon Dioxide*, by E. L. Quinn and Chas. L. Jones (New York, 1936). For a full discussion of the physical and chemical properties of carbon dioxide, and its manufacture in liquid and solid form, see the latter.
4. [SILLIMAN'S JOURNAL] This early interest in solid carbonic gas was carried over into the American literature. Silliman's *American Journal of Science and Arts* carried an item on it as early as 1839; others followed in 1842, 1845, and 1848.
5. [CARBONATING] Extensive improvements in the types of carbonating equipment used at this time in England, France, Germany, and other European countries are discussed by Sulz, and by Goosmann, and they are impressive. Despite that, the European apparatus seems to have received scant attention in the United States.
6. [LIQUID CARBONIC] See publication *The Liquid Carbonic Corporation, 50th Anniversary, 1888-1938* (Chicago, 1938). In 1902 the company became "The Liquid Carbonic Company," and in 1926 "The Liquid Carbonic Corporation."
7. [TUFTS] Chapter "Soda Fountains," by James W. Tufts; p. 470, *One Hundred Years of American Commerce—1795-1895* Chauncey M. Depew, Ed. (New York, 1895).
8. [ZENITH POWDER] Changes already were under way in the means of generating the gas in the bottling plant. Church & Dwight, of New York City, for example, in 1899, were advertising their "Zenith" carbonating powder as a substitute for the marble dust.

CHAPTER 10

1. [PUTNAM PATENTS] Early patents to Henry W. Putnam: No. 23,263 (March 15, 1859); for a bottle stopper fastener. Reissued January 19, 1873; term extended March 15, 1873. That Putnam was not the first with the idea of providing a ready-made cork holder to replace the tying or wiring is evident from Patent No. 14,446 (March 18, 1856) to H. N. DeGraw of Piermont, New York. The Putnam device is much simpler, but it is based upon the same essentials. No. 36,528 (September 23, 1862); device for removing wire cork-fasteners. No. 33,602 (October 29, 1861); reissued June 28, 1870, No. 4050; syrup gauge. No. 115,102 (May 23, 1871) and No. 115,354 (May 30, 1871); device for bending wire cork retainers. Putnam's later patents include other devices for bending wire and making articles of wire, but not related to closures.
2. [ALBERTSON PATENTS] The following patents indicate Albertson's early interest in closures activated by spring mechanism: No. 36,266 (August 26, 1862); Reissue No. 2386 (October 30, 1866), John Matthews, assignee. No. 45,112 (November 15, 1864).
3. [MATTHEWS PATENTS] Early patents to John Matthews, Jr., of New York City: No. 41,440 (February 2, 1864); device for filling ball-stoppered bottles. No. 48,422 (June 25, 1865); spring-activated bottle closure. No. 48,822 (July 18, 1865); internal stopper, activated by magnetic means; long stopper used simulated his later gravitating stopper.

No. 50,832 (November 7, 1865); bottle filling apparatus; bottles filled in inverted position; shows his gravitating stopper.

4. [ALBERTSON PATENTS] Long internal stoppers, such as the Matthews gravitating stopper, were devised to keep them upright in the bottle. Albertson's early interest in this type indicated by his patents: No. 44,684 (October 11, 1864); stopper. No. 44,912 (November 11, 1864); stopper. No. 44,685 (October 11, 1864); filling device for internally stoppered bottles.

5. [MATTHEWS PATENTS] The Matthews gravitating stopper, patented by John Matthews, Jr. of New York, N. Y. No. 67,781 (August 13, 1867); bottle stopper. No. 137,941 (April 15, 1873); improvement of closure member of the foregoing.

6. [Codd PATENTS] U.S. Patent No. 138,230 (April 29, 1873; filed January 21, 1873) issued to Hiram Codd, of Camberwell, England. See also Codd U.S. Patents No. 251,525 (December 27, 1881) corresponding to Br. Pat. 1152 (1881), and No. 270,392 (January 9, 1883) corresponding to Br. Pat. 3252 (1882). Earlier patents were issued to Codd in England; see British Patents No. 3070 (1870), No. 2212 (1871), and No. 2621 (1872). For complete discussion of the development of Codd's closure in England, and of his activity there (died 1887), see article "The Genius of Hiram Codd," by George B. Beattie (*Bottling Quarterly*; London; April, 1958).

7. [ROORBACH PATENTS] Patents issued in the name of William L. Roorbach, Philadelphia, Pa., covering floating-ball stoppers:

No. 272,775 (February 20, 1883); No. 320,701 (June 23, 1885); No. 323,737 (August 4, 1885), one-half interest assigned to S. Twitchell & Bro.

Patent No. 380,957, covering an improvement in the foregoing type was later issued to Selden Twitchell, of Philadelphia, Pa. (1888).

8. [BERNARDIN PATENTS] Protection was claimed by the Bernardin Bottle Cap Company, under the following patents:

No. 314,358 and No. 314,359 (March 24, 1885); Alfred L. Bernardin, Evansville, Ind.; metallic cap and fastener.

No. 374,517 (December 6, 1887); Alfred L. Bernardin; device for making metallic caps.

No. 374,553 (December 6, 1887) device for making metallic caps, patent issued to Wm. H. Northall, Evansville, Ind., assignor.

9. [HUTCHINSON PATENTS] Patents issued to Charles G. Hutchinson, Chicago, Illinois, for the spring-type bottle stopper:

No. 213,992 (April 8, 1879), Reissue No. 8,755 (June 17, 1879) shows the figure 8 form of stem.

No. 219,729 (September 16, 1879), for improvement, in which oval form of loop stem was substituted.

10. [KLEE-MILLER PATENTS] Patent No. 231,230 (August 17, 1880), issued to John Klee, Dayton, Ohio, for spring-type bottle stopper.

Patents covering the Miller spring-type bottle stopper: No. 156,302 (October 27, 1874), to Joel B. Miller, Rondout, New York; No. 245,199 (August 2, 1881), to Joel B. Miller (deceased), of Kingston, New York, Henry W. Putnam, assignee.

11. [PARKHURST PATENT] Patent No. 219,302 (September 2, 1879) issued to Amos F. Parkhurst, Algonquin, Illinois.

12. [PUTNAM PATENTS] Patents to Henry W. Putnam, Bennington, Vermont, covering his early improvements in bottle stoppers and stopper fasteners of the swing type included: No. 207,982 (September 18, 1878, filed March 30, 1877); No. 212,623 (February 25, 1879); No. 224,304 (February 10, 1880).

13. [DE QUILLFELDT PATENTS] Patents covering the swing-type bottle stopper issued to Charle De Quillfeldt, New York, N. Y., and sold by Putnam: No. 158,406 (January 5, 1875; filed November 30, 1874); No. 344,638 (June 29, 1886), for improvement of the foregoing.

14. [MORHOUS PATENTS] Protection for features of the swing-type stoppers was claimed by Henry W. Putnam, as assignee, under patents issued to Frederick P. Morhaus, Bennington, Vermont; No. 377,042 and No. 377,043 (January 31, 1888).

15. [PAINTER PATENTS; TRIUMPH] Patents to William Painter covering the "Triumph" swing-type bottle stopper: No. 315,655 (April 14, 1885; filed November 25, 1884); No. 324,040 (August 11, 1885; filed April 9, 1885), relating to the disk member. A later variation was his Patent No. 438,711 (October 21, 1890).

16. [PAINTER PATENTS; SEAL] Patents to Painter covering the "Bottle Seal": No. 327,099 (September 29, 1885; filed June 5, 1885); for the stopper; No. 438,708 (October 21, 1890), machine for affixing the foregoing on the bottle. Later Patents of Painter on variations and improvements of the "Bottle Seal" included No. 438,709 (October 21, 1890); No. 449,822 (April 7, 1891); No. 528,485-6-7 (October 30, 1894); No. 540,072 (May 28, 1895); No. 615,099 (November 29, 1898). A "Seal" extractor was covered by No. 438,710 (October 21, 1890).

17. [DE LA VERGNE PATENTS] The De La Vergne Bottle and Seal Company claimed patent protection, as assignee, under: No. 461,258 and No. 421,259 (October 13, 1891; filed May 8, 1891), issued to Ernest V. Clemens, of New York, N. Y. for the closure, No. 461,285 (October 13, 1891), issued to Alfred Siebert, New York, N. Y., for machine to affix closures on the bottle.

18. [PAINTER PATENTS; CROWN] Patents to Painter for the "Crown" bottle cap (in order of filing): No. 468,259 (February 2, 1892; filed November 5, 1889); No. 468,258 (February 2, 1892; filed June 16, 1890); No. 468,226 (February 2, 1892; filed May 19, 1891). Later Patents on changes in the crown were No. 582,762 (May 18, 1897); No. 608,157 (July 26, 1898); No. 625,055 (May 16, 1899). The latter was for a crown permitting partial use of the contents. A crown opener was covered by Patent No. 514,200 (February 6, 1894).

19. [PAINTER PATENTS; CROWNS] Machines for affixing the crown to the bottle were covered by Painter Patents No. 473,776 (April 26, 1892); No. 608,158 (July 26, 1898); and No. 638,354 (December 5, 1899). The latter also included the automatic crown feed mechanism, as did No. 643,973 (February 20, 1900). Painter also patented a tool for forming the closure finish on glass bottles No. 443,728 (December 30, 1890), and mechanism for manufacturing the crowns.

CHAPTER 11

1. [BOTTLES] See *The Evolution of the Glass Container Industry*, by Daniel J. James, University of Arkansas, Fayetteville, Ark. (1956), and *History of Glass Containers*, Glass Container Manufacturers Institute (New York).

2. [OWENS PATENTS] See Patents to Michael J. Owens, No. 548,588 (filed 1895, patented October 22, 1895), No. 625,513 (filed 1898, patented May 23, 1899), and No. 635,344 (filed 1898, patented October 24, 1899), for glass blowing machine. The wholly automatic bottle making machine of Owens is covered by Patent No. 766,768 (filed 1903, patented August 2, 1904).

CHAPTER 12

1. [BILLE PATENT] The Bille patent of November 8, 1828 would appear to be the first U.S. patent indexed for washing, filling, and corking bottles. On the same date he was also issued patent covering the drawing and corking of liquors, and another for obtaining heat by combustion. In the *Journal of the Franklin Institute* he is listed as Steen Anderson Bille; Patent Office records show him as Keene A. Bille.

2. [CRONK PATENT] Patent to Munson C. Cronk, of Auburn, New York, No. 6,631 (August 7, 1849), for cleansing bottles.

3. [BOTTLE WASHERS] Patent to A. H. Rauch, Bethlehem, Pa., No. 11,000 (June 6, 1854), for machine for washing bottles. For other early devices of this nature see Patents to Henry N. DeGraw, Watervliet, N. Y., No. 18,086 (September 1, 1857) and to W. B. White & J. A. Whitford, Saratoga Springs, N. Y., No. 20,113 (April 27, 1858).

4. [MATTHEWS WASHER] The principles of this device seem to be covered by Patent to John Matthews, Jr., New York, N. Y., No. 49,538 (August 22, 1865), for a machine for washing bottles.

5. [TRIUMPH WASHER] The "Triumph" bottle washer was marked "Horner's Patent," and would appear to have been protected by Patent issued to Wm. W. Horner of London, England (assignor of one-half to Nathan J. Simonds, of Woburn, Mass.), No. 354,061 (December 7, 1886). It was patented in England, No. 16,426 (December 13, 1884).

6. [LIGHTNING WASHER] Patent No. 329,390 was issued on October 27, 1885 to Joseph M. Hoyt and William G. Hoyt, of Lynn, Mass., covering features of the "Lightning Bottle Washer," and as an improvement on patents previously issued to O. A. Miles and E. R. Lovett, No. 213,583 (March 25, 1879) and to Joseph M. Hoyt, No. 238,289 (March 1, 1881).

7. [EICK WASHER] Patents covering a bottle washer and rinser were issued to Otto Eick, of Philadelphia, Pa.; No. 463,360 (November 17, 1891) for simultaneous cleansing of 12 bottles; and No. 487,999 (December 13, 1892) for 16 bottles.

CHAPTER 13

1. [FLAVORINGS; SOURCES] For other early types of drinks prepared at the soda fountain, and by the bottler, see the following:

Sulz's Compendium of Flavorings, by Charles Herman Sulz (New York, 1888).

McMahon's Latest Recipes and American Soda Water Dispenser's Guide, by Albert C. McMahon (Chicago, 1893). For the Druggist.

American Soda Book of Receipts and Suggestions, published by American Soda Fountain Company (Boston, ca. 1900).

The Standard Manual of Soda or Other Beverages, by A. Emil Hiss (Chicago, 1901). For the Druggist.

The Bottlers' Formulary, by George S. Morris (Kansas City, Kans., 1910).

Manual for the Essence Industry, by Erich Walter (New York, 1916) is a comprehensive text on flavor manufacture and use.

2. [ROOT BEER, ETC.] A popular type of root beer during this period, according to Sulz, included flavoring in which the oils of sassafras, wintergreen, sweet birch, and anise, were the usual ingredients. Various additions were made in individual formulas; some included extract of liquorice root or of wild cherry bark, and ginger. Juniper berries, pipsissewa, spikenard, and various other barks and roots were also sources of flavor used.

Sarsaparilla was generally a compound of the oils of wintergreen, sassafras, sweet birch, anise and orange; occasionally some fluid extract of liquorice root was added. In both, methyl salicylate sometimes took the place of the wintergreen and sweet birch oils.

Pure vanilla flavor was made from the vanilla bean. To the extract of vanilla beans, vanillin or coumarin were added in some formulas, for more flavor. Essence of cinnamon or cassia were sometimes used for supplemental aroma.

3. [GINGER ALES] Formulas (as given by Sulz) generally included extract of ginger, lemon essence, rose essence, and ginger oil essence. Some formulas included various spice tinctures, and fruit essences. A trace of tincture of capsicum was frequently added for pungency.

The Belfast type of ginger ale was noted for its fine aroma, its formula including such as ginger root, orange peel, nutmeg, vanilla, cinnamon, with or without capsicum trace.

Addition of oenanthic ether was sometimes used in the American ginger ales to give aroma similar to the Belfast type.

4. [FOOD LAWS] The common use of preservatives and artificial colors in foods, frequently concealing deterioration or adulteration, was the principal cause of agitation by officials attached to State and municipal health and food agencies for corrective legislation during the period 1900-1906. For example, at the St. Louis Exposition of 1904, manufacturers of preserved foods, entered a large display of practically every brand and variety of canned and bottled foods made in the United States. Food officials of the States of Illinois, Massachusetts, Michigan, Ohio, Kentucky, North Carolina, Minnesota, Utah, Oregon, Connecticut, South Dakota and Nebraska entered an exhibit duplicating many of the cans and bottles

on display in the food manufacturers' booth, each bearing a placard naming the coloring or preservative contained in it, and with samples of the coloring extracted from them. When the Pure Food Bill came up for discussion in the House of Representatives in 1906 several hundred food samples were placed on display— assembled by the U.S. Bureau of Chemistry from grocery stores throughout the country. A bottle of soda water containing artificial color was included.

5. [FLAVORING; CHEMISTRY] *The Story of Chemistry*, by Floyd L. Darrow (p. 386, Indianapolis, 1927).

6. [COMPANIES; SOURCES] Many of the major soft drink manufacturers have published historical data concerning their particular product and company. Some of it has appeared in the trade papers, and in their own house organs, and is usually made available upon request.

CHAPTER 14

1. [PUMP ROOMS; REFERENCES] The general facts concerning the pump-rooms in New York City in 1809 appear in the Appendix on "Mineral Waters," in Marcet's *Conversations on Chemistry* (New Haven, 1809). For soda fountain operations in 1868 see item "Soda Water," *New York Evening Mail*, July 27, 1868 and July 30, 1868.

2. [TRADE MARKS; NAMES] The beverage names presented as having been used by various soda water manufacturers are taken largely from the official records of trademark registrations in the U.S. Patent Office. Many of such registrations were made under the Trade Mark Act of July 8, 1870, which was held unconstitutional in 1879 by the U.S. Supreme Court (Trade Mark Cases, 100 U.S. 82). Later registrations were made under the Trade Mark Act of March 3, 1881, which was superseded by the Trade Mark Act of February 20, 1905. In the absence of contrary basis, the year of registration, or the year of first use claimed (if any), in some cases have been assumed to be approximately the time the business was started. Names of other bottlers listed come from trade papers and city directories of the period, and personal correspondence.

CHAPTER 15

1. [ASSOCIATION PURPOSES] The problems of bottle losses was a major consideration by the industry associations for many years beginning in 1882. This, and the influence of the brewers and beer distributors on the soda water business and its efforts to advance the industry through association activity, are outlined in *Organization in the Soft Drink Industry* (Washington, 1946), pp. 13-46.

2. [TAXES] While ginger ale and soda water were not taxed at this time, there was a tax levied on artificial medicated waters. Some manufacturers of soda water used labels on their products which attributed some therapeutic values to them, and this was basis for an interpretation of the law subjecting them to the tax. Elimination of such data from the labels seems to have made the tax inapplicable. See *National Bottlers' Gazette*, December, 1899.

3. [APOLLINARIS] There was a long period of litigation over the application of import duties to Apollinaris water. The domestic industry contended supplementary carbonation of the water prior to shipment from its European source made it an artificial water, to which an import duty applied. The producers contended such treatment merely replaced the natural carbonation of the water. Decisions favorable to both contentions were given by the courts, but the final decision held the product not artificial, and therefore not taxable. Officials enforcing the Food and Drug Act took the opposite view. Active promotion of the sale of Apollinaris by asserting its superiority over the artificially carbonated mineral waters was basis for dispute with bottlers of the latter, and appears as reason for publication of "*The Mineral Water Controversy. Artificial or Natural? . . . A review of the whole question on behalf of American Mineral waters*," by Carl H. Schultz (New York, 1882).

4. [COMPANY REFERENCES] Items in *Fortune Magazine* give much detail concerning the origin and development of the businesses of Coca-Cola (December, 1938, p. 65), Dr. Pepper (October, 1947, p. 108), Pepsi-Cola (November, 1947,

p. 127). See also *Coca-Cola, a Chronological History; 1886-1956*, published by The Coca-Cola Company.

5. [AUTO TRUCKS] The *National Bottlers' Gazette* for February, 1912, included a section of several pages of data and illustrations concerning auto trucks for bottlers' use; listed were International, Victor, Decatur, Packard, Federal, Velie, Eclipse, Grabowsky, and White; also G. V. Electric Trucks.

6. [COCA-COLA] The rapidly growing popularity of Coca-Cola in the early years of the 1900's and the extent to which competitive products entered the field, with a list of such drinks, is discussed in *Beverages and their Adulteration*, by Harvey W. Wiley, M.D. (Philadelphia, 1919), pp. 109-114. Gay-Ola, mentioned in this Chapter, appears to have been cause for the first of a long series of cases litigated on the basis of infringement of Coca-Cola rights, beginning about 1912; see *The Coca-Cola Company v. The Gay-Ola Company*, 200 Fed. 720, 119 C.C.A. 164 (Circuit Court of Appeals, 6th Circuit); also 211 Fed. 942.

7. [A.B.C.B.; TAXES] The problems and effects upon the industry of the 10% tax on soft drinks levied by the Revenue Act of 1918 were compelling reasons for the organization of the A.B.C.B. in 1919, and amelioration of that situation was its first objective. For details on this industry and association activity, reference is made to *Organization in the Soft Drink Industry* (Washington, 1946), pp. 73-93.

8. [BOTTLE STANDARD] Since the function of the crown cap required a corresponding finish and measurements in the bottle on which it was to be used, the bottle manufacturers necessarily depended upon the crown manufacturers for early direction in that. Bottle finish specifications of the Crown Cork and Seal Company later provided basis for the bottle standard formally approved by the Glass Container Association on January 4, 1923 (G.C.A. No. 600, *Glass Finish, Crown Beverage Finish*), as the first such standard.

9. [COCA-COLA; BOTTLE DESIGN PATENTS] Initial patent on the design of the Coca-Cola bottle—Des. Pat. 48,610, to Alexander Samuelson, issued November 16, 1915 (Root Glass Company, assignee). A later variation in the design was covered by Des. Pat. 63,657, to Chapman J. Root, December 25, 1923.

Among the other prominent proprietary drinks for which patented bottle designs were developed, were Orange Crush (Des. Pat. 55,892; 1920), Chero-Cola (Des. Pat. 69,462; 1926), Whistle (Des. Pat. 70,843; 1926), Try Me (Des. Pat. 71,637; 1926), Dr. Pepper (Des. Pat. 80,695; 1930), Double-Cola (Des. Pat. 86,036; 1932), Howdy (Des. Pat. 86,163; 1932), NuGrape (Des. Pat. 86,746; 1932).

CHAPTER 16

1. [PROHIBITION; REPEAL] The 18th Amendment (Prohibition) was in effect from January 29, 1920, ratification having been proclaimed on January 29, 1919 after approval by the legislatures of 36 States.

The 21st Amendment (Repeal) became effective on December 5, 1933, with legislative approval that day by Pennsylvania, Ohio, and Utah providing the necessary three-fourths of the States.

2. [CANADA DRY] In 1923 Parry D. Saylor and associates purchased the Canada Dry business, the reported price being \$1,000,000, and operated as Canada Dry Ginger Ale, Inc. Saylor became President, remaining in that position until succeeded by Roy W. Moore, in 1935. An article in *Fortune Magazine* reports profits in 1923 \$98,000; in 1929 \$3.5 million; in 1936 \$180,000 (depression). By 1931 sales reached \$13 million. A comprehensive outline of the business, including its expansion into other beverage fields is given in the article "Canada Dry," *Fortune Magazine*, June, 1937, p. 115.

3. [BOTTLES] The problem created by bottle size developments during this period is shown by the results of a bottle standardization program completed in 1930. A total of 78 soda water bottle heights were reduced to 6; 16 bottle weights were reduced to 8; 15 capacities were reduced to 12. The latter included 6, 6½, 7, 8, 9, 10, 16, 24, 26, 28, 30, and 32 ounce capacities. See *Simplified Practice Recommendation R123-30, Carbonated Beverage Bottles* (G.P.O., Washington, 1930). A later program further reduced the varieties; the 12 oz. was added. See S.P.R. R123-43 (1943).

4. [NATIONAL ADVERTISING] Development and progress of this National Advertising Campaign during the years 1926-1929 is discussed at some length in *Organization in the Soft Drink Industry* (Washington, 1946), pp. 114-133.

CHAPTER 17

1. [N.R.A. CODE] The objectives, difficulties, and frustrations of the industry in its efforts to assist in the objectives of the National Recovery Administration, such as in the development of an N.R.A. Code of Fair Competition, are outlined in detail in *Organization in the Soft Drink Industry* (Washington, 1946), pp. 153-170.

CHAPTER 18

1. [WARTIME; RATIONING] Extended discussions of wartime problems and regulatory measures, including rationing and other operating restrictions, are outlined in the A.B.C.B. Annals for the wartime years, in *Organization in the Soft Drink Industry* (Washington, 1946).

2. [VENDING] For extensive historical discussion of mechanical vending, including coin-operated, and with reference to dispensing of soft drinks by this means, see 1954 *Directory of Automatic Merchandising*, published by National Automatic Merchandising Association (Chicago, 1953), pp. 115-131.

CHAPTER 19

1. [CLOSURES; CONTAINERS] The industry's closure and container requirements of mid-century are indicated by the official data on shipments to soft drink bottlers during 1957, as follows: Bottles (returnable)—8,452,000 gross; Bottles (nonreturnable)—1,274,000 gross; Crowns—209,544,000 gross.

See *Containers and Packaging Quarterly*, U.S. Department of Commerce (Washington, Spring 1958), Vol. XI, No. 1.

Cans were used for packaged beer in a small way beginning in 1935; early annual uses approximated 500 million cans, or less than 10% of total packaged beer. By 1957 the packaged beer ratios were—returnable bottles 57.7%, one-way bottles 5.5%, cans 36.8%. The latter accounted for use of 8,153 million cans.

2. [FRANCHISE COMPANY OFFICIALS] The predominance of the franchised drink in the bottled soft drink field demonstrates the important growth of the proprietary company during the Twentieth Century, and its vital connection with industry progress.

The Coca-Cola Company, with headquarters in Atlanta, was headed for several years beginning in 1923 by Robert W. Woodruff, as President. In later years he became Chairman of the Board, and Chairman of the Finance Committee. Lee Talley was elected President of the company in 1958. Harrison Jones served as Executive Vice-President for many years, and later as Chairman of the Board; he retired in 1952. Edgar J. Forio, widely known for activity in industry affairs, was elected Vice President of The Coca-Cola Company in 1943, and later Senior Vice President.

H. C. Grigg, son of C. L. Grigg, founder of the Seven-Up Company, of St. Louis, has been its President since 1940. Wilbur H. Glenn became President of the Nehi Corporation, of Columbus, Georgia in 1955, after a period of long activity in the bottling field. Herbert L. Barnet is President of the Pepsi-Cola Company, succeeding Alfred N. Steele (1950-1955) and Walter S. Mack (1939-1950). R. W. Moore, Sr. served as President of Canada Dry Ginger Ale, Inc. from 1935 to 1957, becoming Chairman of the Board in 1957; R. W. Moore, Jr. is President of the company, now known as Canada Dry Corporation.

Wesby R. Parker became President of the Dr. Pepper Company, of Dallas, in 1958. J. Vernor Davis was elected President of the James Vernor Company (now Vernor's Ginger Ale, Inc.), of Detroit, following the death of James Vernor in 1954. Thomas F. Black, Jr. heads the Clicquot Company, of Millis, Massachusetts, as its President, while Peter vZ. Hires, grandson of the late founder, has been President of the Charles E. Hires Company, of Philadelphia, since 1955.

The Orange Crush Company of Chicago, is headed by J. M. Thompson, President. Lee C. Ward has been President of the Tru-Ade Company, of Elgin, Illinois since 1938. B. R. Murphy is President of Nesbitt Fruit Products, Inc., of Los Angeles, California, while the National NuGrape Company, of Atlanta is headed by W. E. Dimmock, President.

CHAPTER 20

1. [MACHINERY "FIRSTS"] Data on various bottling plant equipment items was provided by the manufacturers in most instances, including the years of introduction to the trade. While some may be designated herein as "first," the finality of any such credit may be debatable, depending upon meaning attached to the term. Periods of experiment and test usually precede introduction; frequently several inventors are engaged in the same field simultaneously; the originator does not always manufacture his invention for sale. Where used herein the reference relates primarily to first introduction for commercial use.

CHAPTER 21

1. [CARBONATION] "Carbonated Mineral Water and Other Beverages," *The Carbonic Acid Industry*, J. C. Goosmann, (Chicago, 1906).
2. [DRY ICE REFERENCE] See Article "109 Degrees Below Zero," *Fortune Magazine* (New York) July, 1932; p. 74.
3. [ELWORTHY; DRY ICE] See Patent No. 579,866, issued March 30, 1897, to H. S. Elworthy. He had previously secured British Patent No. 7,436 (February 15, 1895; later Br. Pat. No. 2,450 (July 26, 1906). Extensive activity in this field did not occur until 1925 and subsequent years. Pages 272-277, of *Carbon Dioxide*, by Quinn and Jones (New York, 1936) gives a comprehensive listing of patents through 1934 relating to the manufacture of solid carbon dioxide, methods and apparatus for its use, and its storage and transportation; U.S. patents and other countries are listed.
4. [SLATE PATENTS] See Patents issued to T. B. Slate; Nos. 1,546,681-2 (July 21, 1925); No. 1,643,590 (Sept. 27, 1927); No. 1,735,094 (Nov. 12, 1929). Also Br. Pat. 237,681 (May 23, 1924).
5. [DRY ICE] In *Dry Ice Corporation of America et al v. Louisiana Dry Ice Corporation et al* the former claimed exclusive right to use the term "Dry Ice" and attempted to stop its use by the defendant. The Court held no such exclusive right to the term exists, in its reference to solid carbon dioxide (54 Fed. 2nd 882; Cert. denied by U.S. Supreme Court, 286 U.S. 558; 1932).

CHAPTER 22

1. [MEYER] For complete discussion of various equipment items developed and introduced by George J. Meyer, see *Forty Years of Progress; 1904-1944*, a publication of the George J. Meyer Manufacturing Company (Cudahy, Wisconsin, 1945).

CHAPTER 23

1. [LIQUID SUGAR] See *This is Liquid Sugar*, a publication of Refined Syrups and Sugars, Inc. (Yonkers, N. Y., 1955).

CHAPTER 24

1. [CONVEYORS: LIFT TRUCKS] Article "How the Tools for Materials Handling Developed," *Modern Materials Handling Magazine* (Boston, May, 1953), discusses origins and developments in conveyors, lift trucks, and other materials handling equipment. The patents covering some are listed.

CHAPTER 26

1. [SILLIMAN] Silliman's *Journal* carried numerous items on mineral waters and their artificial preparation, and on various features of carbon dioxide. As examples, see Volumes for 1821, 1822, 1831, 1832, 1834, 1839, 1842, 1845, and 1848.

An earlier effort of Silliman is shown by his preparation of an American edition of *Henry's Epitome of Experimental Chemistry* in 1810. To that book Silliman added material on the artificial preparation of mineral waters. In the text of his own authorship, later, Silliman relied heavily upon the works of Dr. Robert Hare, Professor of Chemistry at the University of Pennsylvania. Hare's *Compendium of Chemistry* (Philadelphia, 1823) was in three volumes; the appendix to Volume II included a series of plates including "a substitute for Woulfe's or Nouth's apparatus" for impregnating waters with carbonic gas.

2. [U.S. PATENT OFFICE; PATENT RECORDS] Not only was there no official publication of patent claims or descriptions prior to 1843, but on December 15, 1836 the U.S. Patent Office (in Blodgett's Hotel building) and all its records were destroyed by fire. Some effort was made later to obtain copies of patents issued prior to the fire, to duplicate the official records, but this was relatively unsuccessful. (Such copies as were obtained were recorded in manuscript in original volumes retained by the Patent Office and entitled "Restored Patents," but these are notable for absence of the many for which no copies were obtained in the restoration.)

Meanwhile, the new Patent Act of 1836 had been enacted, and applications were examined for novelty and qualification as invention; previous practice was in effect a registration procedure only. Also, in July, 1836 the Patent Office began issuing patents in a numbered series. Some years later these numbered patents were printed, bound, and made available for examination in the Patent Office in Washington.

However, prior to 1843 the annual reports of the Patent Office gave only the names of the inventor-patentees, the titles of the inventions, and the date on which allowed. Descriptions of the inventions, and claims, were not included. Similar listings were included in private publications, such as the quarterly issues of the *American Journal of Improvements in the Useful Arts and Mirror of the Patent Office* (Vol. 1, 1828).

This publication, and others, also reprinted many of the patents issued, with drawings, or fully described them, and it was only by such means that details were available concerning patents issued without searching the Patent Office files or having special copies made.

The *Journal of the Franklin Institute* included comprehensive reports on patents issued by the Patent Office in its issues from 1826 to 1859.

Then in 1840, as directed by Act of Congress, "A Digest of Patents issued by the United States from 1790 to January 1, 1839" was published under the superintendence of the Commissioner of Patents (Printed by Peter Force, Washington, 1840) although this included only the alphabetical listing of patentees, classified lists of patents issued, and dates of issuance.

Beginning in 1843, with Patent No. 2901, the listing in the annual Patent Office Reports was expanded and brief descriptive matter relating to inventions patented was included. But this, too, was far from satisfactory as a means for general dissemination of the information, and the private media, such as the *Journal of the Franklin Institute*, continued to meet the popular need.

In 1871 the Patent Office Reports were ordered discontinued by Congress, and the Commissioner of Patents was directed to have printed copies of patents issued after July 1, 1869 available for sale to the public at nominal cost, and for distribution to libraries. Publication of the *Official Gazette of the Patent Office*, with data on patents issued, began on January 1, 1872. By these means a ready source of information on patents has continued to be available.

In 1874 the Patent Office prepared and published an index, by categories of inventions, of all patents previously issued. This was entitled "Subject Matter Index of Patents for Inventions issued by the United States Patent Office, from 1790 to 1873 inclusive" (Government Printing Office, Washington, 1874). Unfortunately, this published index includes no separate alphabetical listing of patentees during that period. A list of trade mark registrations, since 1870, is included in the index, separately.

In the annual indexes of patents issued subsequent to 1873, patents are listed by category or class of invention, and there is also a separate alphabetical listing

of patentees. Trade mark registrations in each year are included in these index volumes.

See *The Patent Office; Its History, Activities, and Organization*, by Gustavus A. Weber (Baltimore, 1924), and *The Story of the American Patent System, 1790-1952* (Government Printing Office, Washington, 1953).

3. [INSTITUTIONS] A thorough discussion of the historical development of institutions for the promotion of the useful arts, including their efforts through the industrial exhibition medium, is included in the *Annual Report of the American Institute of the City of New York*, for the years 1863-1864 (Albany, 1864): The author of the material (Charles P. Daly, LL. D.) outlines particularly development of early societies for promotion of the mechanical arts, such as the Philadelphia Society for the Promotion of Agriculture, Massachusetts Society for the Promotion of Agriculture, New York Society for Promotion of the Useful Arts, American Society for Encouragement of Domestic Manufactures, Franklin Institute, Massachusetts Charitable Mechanic's Association, Mechanics' Institute of the City of New York, Maryland Institute, Metropolitan Mechanics' Institute of the City of Washington, and others.

4. [SCIENTIFIC AMERICAN] The general scope of coverage of this magazine may be indicated by the book *The Progress of Inventions in the Nineteenth Century*, by Edward W. Byrn (published by Munn & Co., Scientific American Office, New York, 1900).

5. [BOOKS FOR BOTTLERS] As examples, see available books listed in the *National Bottlers' Gazette* (issued November, 1891), and *Western Bottler* (issued May, 1894).

6. [DRUGGISTS' CIRCULAR; PHARMACEUTICAL ERA] The *American Druggists' Circular and Chemical Gazette*, of New York City, which published its first issue in January, 1857, was the earliest of the trade papers in the drug field. In 1907 its name was changed to the *Druggist's Circular*, and in 1940 it was merged with *Drug Topics*. *New Remedies* began publication a little later, in 1871, with Dr. Horatio C. Wood as its first editor, and was another of the leading drug trade journals which occasionally included instructive material on the making of soda water in its columns. In 1884 its name was changed to the *American Druggist*, under which name it is still published. Caswell A. Mayo became its Editor in 1893, and Murray Breese in 1927.

Then there was the *Pharmaceutical Era*, published by D. O. Haynes & Co. of New York City, from 1887 to 1932, with A. B. Lyons as its first Editor. Beginning in 1906 the firm also published a specific magazine for the fountain trade, titled *The Soda Fountain*. In 1913 a collection of the material previously published in the *Pharmaceutical Era*, by Louis A. Becker, was issued in booklet form under the title *The Soda Fountain Industry*.

7. [NATIONAL BOTTLERS' GAZETTE] As a source of data concerning developments in the bottled carbonated beverage industry current with its each issue through the years, monthly issues of the *National Bottlers' Gazette* provide a continuing, comprehensive story of the industry for the complete period 1882 to date. Its 50th Anniversary Number for March, 1931, and its 75th Anniversary Number for March, 1957, particularly, provide a wealth of information, well illustrated, for the industry's history minded.

8. [FELLOWSHIP PUBLICATIONS] A list of such items is included in the Appendix to *Organization in the Soft Drink Industry—History of the A.B.C.B.* pp. 338-342, by John J. Riley (Washington, 1946).

9. [A.B.C.B. MANUALS] Early manuals published by the association include *Management and Cost Control in the Carbonated Beverage Industry* (1929), and the *Standard Accounting System Manual* (1930). Others are *Manual of Job Evaluation* (1946), *Manual of Aptitude Testing* (1947), *Manual of Sales Management* (1949), *Manual of Profit Planning* (1950). The foregoing are cited from a long list of instructive materials published by the association for the assistance of its members.

CHAPTER 27

1. [FIRST A.B.C.B. OFFICERS] The following constituted the first Officers and Executive Board, elected at the 1919 meeting:

President: JAMES VERNOR, JR., James Vernor Company, Detroit, Michigan
Vice President: L. C. BROWN, Athens Coca-Cola Bottling Co., Athens, Georgia
Treasurer: GEORGE C. BIDGOOD, Beaufont Company, Richmond, Virginia
Executive Board: WM. B. HATFIELD, Hatfield & Bell, Brooklyn, New York
 JOHN M. SILVER, Superior Bottling Works, Superior, Nebraska
 W. M. ROOD, Michigan Parfay Co., Inc., Detroit, Michigan
 CHAS. V. RAINWATER, Coca-Cola Bottling Co., Pensacola, Florida
 H. A. RENZ, Chero-Cola Bottling Co.,

Inc., Washington, D. C.
 L. G. HIEBEL, So. Wisc. Coca-Cola Bottling Co., Madison, Wisconsin
 HUGH J. McMACKIN, Eastern Soda Water Bottlers Ass'n, Boston, Massachusetts
 O. L. BIEDENHARN, Coca-Cola Bottling Co., Shreveport, Louisiana
 C. W. SAUNDERS, Old Dominion Beverage Corp., Richmond, Virginia
 FRANK A. WEGENER, A. Wegener's Sons Co., Detroit, Michigan
 L. E. YUNCKER, Coca-Cola Bottling Co., Indianapolis, Indiana
 J. B. RIES, Jacob Ries Bottling Works, Shakopee, Minnesota

2. [CHESTERMAN AWARD WINNERS] The 1946 Chesterman Award was conferred upon John H. Buchanan, M.S., former Professor of Chemistry at Iowa State College, for his work on the preparation and use of sweetening agents and flavoring materials, in the form of syrups, in bottled soft drink manufacture.

The 1950 Chesterman Award was a joint award, won by Samuel S. Epstein, Ph.D., Vice-President and Chemist, of Kirsch's Beverages, Inc., Brooklyn, N. Y., and Mooson Kwauk, M.S., Division Engineer of the Coca-Cola Export Corporation. Dr. Epstein's study covered "Practical and Technical Aspects of Sanitation in Beverage Plants" and "Quaternaries Kill Yeasts Found in Carbonated Beverages." Mr. Kwauk's entry was titled "Quantitative Studies on Carbonation."

The 1957 Chesterman Award was conferred upon James P. Poole, Ph.D., Research Director of the Brockway Glass Company, Brockway, Pa. in recognition of his research and development work on a process of surface coating glass containers with silicones for protective purposes, including his numerous published papers on that subject.

3. [A.B.C.B. MEDAL AWARDS] The A.B.C.B. Medal of Industry Service, with Citation has been awarded to the following—(1944) James Vernor, James Vernor Company, Detroit, Michigan; (1945) Charles V. Rainwater, Hygeia Coca-Cola Bottling Company, Pensacola, Florida; (1946) Hugh J. McMackin, Secretary, Massachusetts Bottlers of Carbonated Beverages, Boston, Massachusetts; (1947) Thomas Moore, Coca-Cola Bottling Company of Minnesota, Inc., Minneapolis, Minnesota; (1949) George S. Derry, Philadelphia Coca-Cola Bottling Co., Philadelphia, Pa.; (1951) Edward Wagner, W. T. Wagner's Sons Company, Cincinnati, Ohio; (1952) John F. Leary, C. Leary & Company, Newburyport, Mass.; (1956) John J. Riley, Secretary, American Bottlers of Carbonated Beverages, Washington, D. C.; (1958) Edgar J. Forio, The Coca-Cola Company, Atlanta, Georgia.

4. [COST CONTROLS] Issued first to A.B.C.B. members, as sections in pamphlet form, the discussions of cost control practices in the industry were the first of their kind. Later combined in book form, the study was issued as "Management and Cost Control in the Carbonated Beverage Industry" (1929). The A.B.C.B. Standard Accounting System and the "Standard Accounting System Manual" were first published in 1930.

5. [INDUSTRY STATUS] Illustrative of means adopted to inform officials and others of the nature of the industry, its products, and its standing in the national economy, was the publication "The Status of the Bottled Soft Drink Industry and Its Products in the Wartime Economy," issued in 1943. It was widely circulated in Government circles. For post-war uses it was revised and published as "The Status of the Bottled Soft Drink Industry in the National Economy" (1951).

6. [A.B.C.B. MANUALS] A listing of these industry manuals includes: A.B.C.B. Plan Operation Manual (1939); Beverage Production and Plant Operation (1946).

7. [INDUSTRY CONFERENCES] During the period March-August, 1947, a series of local conferences on Employment Procedures for A.B.C.B. members was held in 20 cities; in January-February, 1949, a series of ten conferences on Sales Management in 10 cities; in February-April, 1950, another series on Profit Planning in 8 cities. A general conference on Cost Procedures was held in New York City in February, 1952.

8. [CONVENTIONS] For the dates, locations, and program of each A.B.C.B. Annual Meeting 1920-1945, see "Organization in the Soft Drink Industry—a History of the A.B.C.B.," by John J. Riley (Washington, 1946).

A detailed discussion of the objectives and annual activities of the American Bottlers of Carbonated Beverages, including its predecessor organizations, and lists of individuals active in functions of the associations are included in the organization history.

9. [A.B.C.B. PRESIDENTS-SECRETARIES] The following members of the bottled carbonated beverage industry were elected President of the A.B.C.B. for the years indicated:

JAMES VERNOR1920-21	PAUL F. GLASER.....1939-40
James Vernor Company, Detroit, Michigan	Glaser Beverages, Inc., Seattle, Washington
C. V. RAINWATER.....1922	EDWARD WAGNER1941-42
Coca-Cola Bottling Co., Pensacola, Florida	W. T. Wagner's Sons Co., Cincinnati, Ohio
SIDNEY W. LEE.....1923-24	JOHN F. LEARY.....1943-44
Buffalo Rock Company, Birmingham, Alabama	C. Leary & Co., Newburyport, Massachusetts
W. B. HATFIELD.....1925-26	JOSEPH W. MILNER.....1945-46
Hatfield & Bell, Brooklyn, New York	Coast Coca-Cola Bottling Co., Gulfport, Mississippi
C. B. CHESTERMAN.....1927-28	THOMAS F. MANSFIELD.....1947-48
Chesterman Company, Sioux City, Iowa	Mansfield Beverage Co., Inc., Newark, New Jersey
CARL A. JONES.....1929-30	TRUMAN M. GILL.....1949-50
Dixie Coca-Cola Bottling Works, Bristol, Virginia	Beeville Coca-Cola Bottling Co., Beeville, Texas
VIRGIL BROWNE1931-32	A. G. BEAMAN.....1951-52
Coca-Cola Bottling Co., Oklahoma City, Oklahoma	Seven-Up Bottling Co. of Nashville, Inc., Nashville, Tennessee
MARTIN L. SCHMIDT.....1933-34	E. ROBERT ANDERSON.....1953-54
Coca-Cola Bottling Co., Louisville, Kentucky	Rochester Coca-Cola Bottling Co., Rochester, New York
THOMAS MOORE1935-36	JOSEPH F. NERNEY.....1955-56
Coca-Cola Bottling Co. of Minn., Inc., Minneapolis, Minnesota	Pequot Beverage Company, Attleboro, Massachusetts
CHARLES P. NEVIN.....1937	EDWIN F. WAGNER.....1957-58
Nevin-Frank Company, Butte, Montana	Seven-Up Bottling Company, Madison, Illinois
GEORGE S. DERRY.....1937-38	
Phila. Coca-Cola Bottling Co., Philadelphia, Pennsylvania	

The executive official of the association is the Secretary, appointed by the Executive Board. Junior Owens, of Benton Harbor, Michigan, served during the years 1920-1934; James L. Oliver, Detroit, Michigan (1934-1939); John J. Riley, Washington, D. C. (1939-).

10. [SOFT DRINK TAX] The 1¢ soft drink tax is in effect in two States at this time (1957). The tax was enacted in South Carolina in 1925, and in West Virginia in 1951. It was in effect in Pennsylvania from 1947 to 1951, and expired in the latter year; in Kentucky for a few months in 1936-37.

PART VII

A Chronology of the Background of Bottled Carbonated Beverages, and Development of the Industry in America.

A Chronology of Industry Background and Development: 1807-1957

Preliminary—In Europe

- 1450- Early interest in the virtues of European mineral springs,
1550 starting long series of studies and experiments by noted physicians and scientists of Europe. Paracelsus was among the first, making observations on the properties of effervescent mineral waters.
- 1560 Thurneysser (Switzerland). First known attempt to duplicate natural mineral waters.
- 1597 Libavius (Germany). Reported on effervescence (spiritus silvestris) and other qualities of mineral waters.
- 1620 Van Helmont (Belgium). First to apply the name "gas" to vapors of the mineral springs, and identified other sources of the gas.
- 1680 Hierne (Sweden). Reports on his analysis of mineral waters.
- 1685 Boyle (England). Analyzed mineral waters and suggested imitating them; referred to the effervescent factor as "artificial air."
Hoffmann (Germany). Suggested artificial preparation of the effervescent mineral waters, calling the gaseous content "spiritus mineralis."

- 1713 Chrouet (England). Collected gaseous vapor given off by waters of "Spa"; first account of an attempt at complete analysis; called effervescent principle "acide aerien," or aerial acid.
- 1717 Seip (England). Studied "Pyrmont" (Germany) and "Spa" (Holland) mineral spring waters.
- 1720 Boerhaave (Holland). Experimented with sources of gas, which he called "acidum vagum fodinerum"; obtained gas from chalk; did not recognize its chemical properties.
- 1739 Hales (England). Interested in gases; experimented with mineral waters.
- 1741 Brownrigg (England). Showed identity of the gas he called "mephitic air," in mineral waters, with that from other sources; described preparation of artificial effervescent waters.
- 1748 Springfield (England). Observations on "Spa" mineral waters; confused effervescence with air.
- 1750 Venel (France). French Academy shown effervescent waters prepared artificially; considered gas as "super-abundant air"; first use of term "aerated water."
- 1754 Black (Scotland). Showed relation of the gas to alkalies; first use of term "fixed air" for it; considered first real progress in knowledge of chemistry of the gas.
- 1756 Lucas (England). Showed slight acid nature of the effervescence in mineral waters; also that effervescence held salts in solution.
- 1764 Macbride (Ireland). Recognized medicinal uses of effervescent waters, showing their antiseptic and antiscorbutic properties.
- 1766 Cavendish (England). Studied properties of water for absorbing "fixed air," which he distinguished from atmospheric air; described impregnating device similar to that later used by Priestley.

- 1767 Bewley (England). First to prepare a mixture of bicarbonate with carbonated water as his "mephitic julep," later termed "soda water"; suggested use with lemonade or other slight acidulant to promote effervescence. Priestley (England). Experimented with artificial impregnation of water with "fixed air" at local brewery.
- 1769 Lane (England). Recognized properties of "fixed air" in imitating natural mineral waters; experimented with preparing them.
- 1771 Bergman (Sweden). Prepared artificial mineral waters for own use.
- 1772 Priestley (England). Observations on different kinds of air, including "fixed air," before Royal Society of London.
- 1773 Priestley (England). Received Copley Medal from Royal Society on findings that "common water impregnated with this fluid (fixed air) alone might be useful in medicine..." Bergman (Sweden). Described duplication of mineral waters to Royal Academy of Sciences, Stockholm; used term "aerial acid." Later papers on analyses appeared in 1775.
- 1774 Nooth (England). Apparatus he developed for generating gas and impregnating water described before Royal Society of London. Priestley (England). Publication discussed his findings on "fixed air" and its properties, and artificial impregnation of water with it.
- 1776 Gahn (Sweden). Pupil of Bergman, made bottled effervescent waters in a limited way. Scheele (Sweden). Associated with Bergman at the university at Upsala; studied nature of the gas, methods of saturating water with it, and properties of the effervescent water.
- 1778 Falconer (England). Reported on his successful use of the carbonated waters for medical purposes. Others made similar findings at this time. Macquer (France). Devised means of washing and purifying the gas generated, for more acceptable use; called it "mephitic gas."

- 1780 Duchanoy (France). Published treatise on the art of imitating mineral waters, describing his process and apparatus, and that of de Chaulnes.
- 1781 Henry (England). Described and used improvement of Nooth device for preparation of artificially carbonated waters in larger quantities, for commercial use.
- 1782 Lavoisier and Laplace (France). Determined the chemical composition of the gas; named it "d'acide du charbon," and "gas acide carbonique" (carbonic acid gas).
- 1783 Meyer (Germany). Established commercial manufacture of artificial Seltzer water.
- 1789 Lavoisier (France). Invented the gasometer for collection of gas generated.
Paul, Schweppe, and Gosse (Switzerland). Started artificial mineral water business at Geneva.
- 1790 Chaptal (France). Summarized experiments and studies on carbonic gas in his text "Elements of Chemistry."
- 1794 Schweppe (England). Schweppe left Geneva and opened artificial mineral water business in Bristol, England.
- 1798 Cavallo (England). Earliest mention of "soda water" in his reference to "acidulous soda water," and to "the soda water which is now prepared and sold in London by a Mr. Schweppe."
- 1799 Paul (France). Opened artificial mineral water business in Paris in 1799; used compression pump for making aerated waters; also substituted glass bottles for the earthenware bottles he found too porous.
Thwaites (Ireland). Established business in Dublin known as A. & R. Thwaites & Company, selling "Soda water" and other artificial mineral waters on a large scale.
- 1802 Paul (England). Started an artificial mineral water business in London, first as N. Paul & Company, later as Paul

& Burrows. Paul is generally credited with establishing the trade on a commercial basis in Europe.

- 1805 Fourcroy (France). First use of term "gaz oxide de carbone" (carbon dioxide); in *Encyclopedie Methodique*.

*General Development of the
Bottled Carbonated Beverage Industry
In the United States*

Preliminary—In America

U.S. Constitution ratified; Delaware, Pennsylvania, New Jersey, Georgia, Connecticut, Massachusetts, Maryland, South Carolina, New Hampshire, Virginia, New York, North Carolina, Rhode Island (1788-1790); Washington inaugurated first president, 1st Congress—New York City (1789). Congress meets in Philadelphia, as national capital (1790-1800).

First census of population 3,929,000 (1790).

States admitted: Vermont (1791), Kentucky (1792), Tennessee (1796). First tariff act aids U.S. shipping (1789); further impetus by European wars, sea commerce prosperity (1793-1796); U.S.-French hostilities, depression (1797-1800).

First American bank, Philadelphia (1781); Yellow fever epidemics, Philadelphia and New York (1792-1797); New York stock exchange (1792); Whitney's cotton gin (1793); Navy Department (1798); ice shipped from New York to South Carolina (1799).

- 1773 American scientists interested in natural effervescent mineral waters; studied their chemistry and beneficial properties: Dr. Benjamin Rush (Philadelphia); Dr. Samuel Tenney (Massachusetts); others included David Rittenhouse (Philadelphia); Thomas Jefferson (Virginia); James Madison (Virginia).
- 1785
- 1787 Dr. Samuel Latham Mitchill (New York). Studied the effervescent waters of Saratoga Springs; reported on their beneficial properties.
- 1792 Dr. Valentine Seaman (New York). Also studied effervescent waters of Saratoga and described process for making them artificially.
- 1794 Dr. Benjamin Waterhouse (Boston), studied the effervescence of Saratoga Springs waters; published in 1805.

1800-1810

- U.S. population 5,308,000 (1800).
 Ohio admitted (1803). Louisiana Purchase (1803).
 Maritime commerce prosperity (1805-1807); Embargo depression (1808-1809); foreign prohibitions almost destroy U.S. shipping.
 Over 500 newspapers in U.S. (1800); Federal Government moves to Washington (1800); Fulton's steamboat on Hudson River (1807).
- 1806 Benjamin Silliman, Professor of Chemistry at Yale College, New Haven. Experimented with "Soda Water."
- 1807 Silliman (New Haven). Opened in New Haven an establishment for public dispensing of bottled "Soda Water" and other waters; March, 1807.
 Joseph Hawkins (Philadelphia). Opened establishment in Philadelphia for dispensing "Soda Water" and other artificial effervescent waters, draught and in bottles; firm first known as Cohen & Hawkins, later Shaw & Hawkins.
- 1808 The Port Folio (Philadelphia). Published first description of American commercial manufacture of effervescent waters, by Hawkins.
- 1809 First U. S. patent for preparing artificial mineral water issued to Joseph Hawkins.
 Carbonated mineral water spas operating in New York City at Tontine Coffee House, City Hotel, Longworth's Shakespeare Gallery, and at apothecary shops; also bottled for shipping by others.
 Egg-shaped bottle in use for artificial mineral waters; mentioned by Paul and by Hamilton (England); origin claimed by both.
 Silliman reported refreshing value of soda water, with wine and sugar, in "Conversations on Chemistry" (Appendix).

1810-1820

- U.S. population 7,240,000 (1810).
 States admitted: Louisiana (1812); Indiana (1816); Mississippi (1817); Illinois (1818); Alabama (1819). Florida Purchase (1819).
 Trade prosperity (1810-1812); War with England—depression (1812-1814); post war recovery, manufacturing impetus (1815-1819).
 First steamboat on Mississippi River (1811); 200 cotton mills in northeast (1812); gas street lighting in Baltimore (1816); domestic porcelain manufactured (1819); first trans-Atlantic steamship, "Savannah" (1819); first canned goods (1819); U.S. Pharmacopoeia (1820).

- 1810 Simons and Riondel (Charleston, S. C.). Obtained U. S. patent for saturating water with carbonic acid gas, or "fixed air."
- 1812 Philadelphia pharmacists show interest and activity in preparation of soda water for public dispensing.
- 1813 Siphon bottle patented by Charles Plinth (England).
- 1814 Principle of counter-pressure used in vessels containing carbonic gas discussed; appears in British patents.
 American Artists' Manual, and Emporium of Arts and Sciences, both published in Philadelphia, include explanation of manufacture of artificial mineral waters, including carbonation.
- 1815 Bramah system of carbonating waters is developed in England.
 U. S. patents issued on carbonated mead and carbonated sarsaparilla mead.
 Samuel Fahnestock (Lancaster, Pa.). Patent on reservoir for carbonated waters; called a portable "fountain".

1820-1830

- U.S. population 9,638,000 (1820).
 States admitted: Maine (1820), Missouri (1821).
 Primary postwar depression (1819-1821); fluctuating business conditions (1821-1830).
 Machine-made paper (1820); Philadelphia College of Pharmacy (1821); Monroe Doctrine (1823); first exhibition of Franklin Institute, Philadelphia (1824); completion of Erie Canal (1825); railroads begin, Baltimore & Ohio (1827-1829); first exhibition of American Institute, New York City (1828).
- 1820 U. S. Pharmacopoeia. Listed "Soda Water" among medicated waters; contained carbonate of soda; carbonated water without soda listed as "Carbonic Acid Water"; directions given for making sarsaparilla syrup.
- 1823 Michael Faraday (England). Produced liquid carbon dioxide in laboratory experiments.
- 1825 Elias Durand (Philadelphia). Dispensed carbonic acid water at his apothecary shop, with novel equipment.
- 1826 John Clarke (Saratoga Springs, N. Y.). Operated shop for bottling effervescent waters of Saratoga Springs; 1200 bottles a day.

- 1828 K. A. Bille (New York). Obtained first patent on device for washing, filling, and corking bottles (for liquors).

1830-1840

- U.S. population 12,866,000 (1830).
States admitted: Arkansas (1836), Michigan (1837).
Credit land boom period (1830-1836); business failures and general distress—Panic of 1837 (1837-1838); cotton boom (1838-1839).
Over 1,000 newspapers in U.S. (1830); first street railway, New York City (1832); first oranges and lemons imported from Sicily (1832); cholera in New York City (1832-1835); McCormick reaper (1834); U.S. Patent Office destroyed by fire (1836); Smithsonian Institution established (1838).
- 1830 Use of syrups for flavoring effervescent waters reported by Journal of Health (Philadelphia).
Improved soda water apparatus, using metal vessel and force pump, devised by Robert Hare (University of Pennsylvania); illustrated in Silliman's "Elements of Chemistry."
- 1831 Carbonate of soda had disappeared as an ingredient of "Soda Water"; use of term as generic designation continues.
U. S. patents issued for several types of counter fountains for dispensing soda water.
- 1832 John Matthews (New York City). Entered the soda water trade; began manufacture of soda water apparatus.
- 1834 U. S. Dispensary (Philadelphia). Included recipes for soda water flavoring syrups; sarsaparilla, lemon, strawberry, raspberry, and ginger.
- 1835 Thilorier (France). Duplicated Faraday's making of liquid carbon dioxide, on a larger scale.
John Lippincott (Philadelphia). Started manufacture of soda tank fountains; later soda water apparatus.
Durand, in Philadelphia, also opened shop for manufacturing and bottling effervescent waters.
- 1836 U. S. Patent Office destroyed by fire, including all copies of patents previously issued.
- 1837 Flavoring syrups for soda water, made from fruit juices; used at the apothecary shops.
- 1839 Eugene Roussel (Philadelphia). Bottled lemon flavored soda water, about 1838-9.

1840-1850

- U.S. population 17,069,000 (1840).
States admitted: Florida and Texas (1845), Iowa (1836), Wisconsin (1848). Acquisition of New Mexico and California (1848).
Debt repudiation depression (1840-1845); War with Mexico (1846-1848); war prosperity (1845-1850).
Adams Express (1840); 1,000 patents issued (1840); first advertising agency (1840); Croton Aqueduct completed in New York City (1842); first telegraph line, Washington-Baltimore (1844); first sewing machine, of Howe (1846); steam heating in public buildings (1846); Pennsylvania Railroad (1846); gold discovered in California (1848); Corliss steam engine (1849).
- 1840 Use of counter-pressure in the bottling process appears; French development about 1837.
- 1842 Alvin D. Puffer (Boston). Started in the manufacture of soda water apparatus.
- 1843 Several bottling shops for making soda water opened in New York City.
- 1844 George S. Twitchell (Philadelphia). Purchased root beer brewery of Charles Whittemore.
- 1847 William Gee (New York). Began the manufacture of soda water apparatus; was previously with Matthews.
- 1848 William Hutchinson (Chicago). Opened bottling shop; made spruce small beer, then soda water; later W. H. Hutchinson & Son.
- 1849 Munson C. Cronk (Auburn, N. Y.). Received early patent on device for washing bottles, using pressure pump.

1850-1860

- U.S. population 23,192,000 (1850).
States admitted: California (1850); Minnesota (1858), Oregon (1859).
Prosperity period, gold inflation (1850-1857); financial distress—Panic of 1857 (1857-1859).
First ice machine patented (1850); Western Union (1851); Wells, Fargo & Company (1852); International Exhibition, Crystal Palace, New York City (1853); first Atlantic cable (1858); Atlantic & Pacific Tea Company (1859).
- 1850 Census reported 64 plants for making bottled soda water in operation in the United States; capital \$229,700; value of production \$760,500.
Early bottling tables, hand-foot operated for filling and corking, appear in this decade. Wooden delivery cases (24 bottles) also in use.

- 1854 A. H. Rauch (Bethlehem, Pa.) Obtained early patent on machine for mechanical washing of bottles; inside and outside; hand operated, or power.
Gustavus D. Dows (Boston). Started making soda water apparatus.
Early carbonating machines patented, for filling fountains, and for bottling.
- 1855 Gee (New York). Obtained patent for gas generator cylinder; was first of his many patents for soda water apparatus.
- 1856 A. Quantin (Philadelphia). Granted first patent for syrup gauge used on bottling machine.
- 1857 First design patent on urn-type counter fountain for dispensing soda water issued to Joseph Bernhard, of Philadelphia; sold as Hindermeyer fountain.
- 1859 Henry W. Putnam (Cleveland). Patents issued on wire clamp retainer for bottle corks.
American Institute Exhibition, New York City, included soda water apparatus manufactured by John Matthews.

1860-1870

U.S. population 31,443,000 (1860).

States admitted: Kansas (1861), West Virginia (1863), Nevada (1864), Nebraska (1867). Alaska purchase (1867).

Civil War begins (1861); depression (1861-1862); war prosperity (1863-1865); Civil War ends (1865); primary postwar depression (1865-1866); fluctuating business conditions (1866-1869).

Oil wells in Pennsylvania (1861); trans-continental telegraph (1861); first Federal income tax (1861, terminated 1870); brewers' association organized (1862); postal money orders (1864); Pullman Palace Car Company (1867); first transcontinental railroad, Union Pacific-Central Pacific (1869).

- 1860 Census reported 123 plants for bottling soda water operating in the United States; capital \$586,000; value of production \$1,415,000; 38 included in 7 metropolitan areas; 14 in New York City and Brooklyn.
Soda water apparatus for fountain operators being widely advertised by Matthews, Gee, Bigelow, Morse, Wood & Nichols, and others.
John Matthews firm (New York). Issued their first catalogue of soda water apparatus manufactured.
Dows advertised "Iced Cream Soda"; Puffer's "Frigid Cream Soda" also advertised; sweet cream used.

- 1861 H. W. Putnam obtained U. S. patent on syrup gauge, widely used in industry, on bottling tables; later opened supply business in New York City.
Dows (Boston). Made first marble soda fountain and obtained patent; also credited as first U. S. bottler of ginger ale.
Puffer (Boston). Patented and introduced "Magic" draft tube for soda fountains; single faucet used for several flavors.
Name "Pop" used for flavored soda water in bottles.
- 1862 American soda water equipment, made by firm of John Matthews, wins recognition at International Exhibition in London.
- 1863 James W. Tufts (Boston). Obtained patent on "Arctic" soda fountain; started manufacturing fountains and soda water apparatus.
Gee (New York). Patented double-stream draft tube for soda fountain use.
- 1864 John Matthews, Jr., (New York). Granted patent for screen protective device on bottle filler; first of long series of patents issued to him.
Matthews and Albertson patent gravitating stopper types, and filling apparatus for them.
Four soda water bottling plants were operating in Washington during the Civil War.
- 1865 Powers and Weightman (Philadelphia). Advertised flavors for soda water; pineapple, black cherry, orange, apple, strawberry, raspberry, gooseberry, pear, melon, lemon, cherry, plum, grape, apricot, peach.
- 1866 Patent issued to John Matthews on soda water bottling apparatus; included counter-pressure feature.
Cantrell & Cochrane (Ireland). Entered the American trade with ginger ale bottled in Ireland; origin of ginger ale generally credited to Dr. Cantrell, during 1850-1852 period.
- 1868 Elaborate soda fountains in apothecary shops, New York City, were popular; carbonated water in tanks provided by local bottlers.

- 1869 Tufts (Boston). Invented and patented the "cottage style" marble soda fountain.
Bottled lemon soda, and sarsaparilla were popular.
Selden Twitchell (Philadelphia). Started bottlers' supply house; later S. Twitchell Company.

1870-1880

U.S. population 39,818,000 (1870).

Colorado admitted (1876).

Expansion prosperity (1870-1873); financial panic (1873); postwar depression (1873-1879).

Advertising pages increased in national magazines (1870); Standard Oil Company (1870); wood-pulp paper for newsprint (1870); disastrous fires, in Chicago (1871), Boston (1872); typewriting machines on sale (1874); 380,000 tons steel manufactured (1875); electric dynamo and arc light at Centennial Exposition (1876); Centennial Exposition, Philadelphia (1876); Bell telephone (1877); Edison's incandescent electric light (1879).

- 1870 Census reported 387 soda water bottling plants operating in the United States; capital \$3,460,000; value of production \$4,200,000.

Census also showed 13 firms engaged in the manufacture of soda water apparatus for soda fountains; sales \$813,000. Progress in flavoring chemistry dates from this decade; Tiemann and Wallach obtained vanillin in 1872.

- 1871 First soft drink trademark registration, "Lemon's Superior Sparkling Ginger Ale."

- 1872 Patent issued to John Matthews on early improvement in steel fountain (tank).

Term "Ice Cream Soda" was in general use for mixture of soda water, syrups, and sweet cream.

- 1873 Internal ball-stoppered bottle patented in U. S. by Hiram Codd, of England; had prior British patent.

Hot soda water featured by manufacturers.

- 1874 Charles de Quillfeldt (New York). Patented swing-type bottle stopper; later acquired by Putnam.

Robert M. Green (Philadelphia). Generally credited with first mixing ice cream and soda water to make ice cream soda; at Franklin Institute exposition in Philadelphia.

- 1875 Walter N. Hill (Newport, R. I.) Developed production of liquid carbon dioxide in quantity for U. S. Navy, at Naval Station; used as torpedo propellant.

- 1876 Charles E. Hires (Philadelphia). Began manufacture of root beer preparation. Product demonstrated at Centennial Exhibition.

Centennial Exhibition in Philadelphia; soft drink concession awarded to Lippincott and Tufts, for \$50,000.

- 1877 Carbonated Drinks Quarterly started as a soda water trade publication, New York City; discontinued 1883.
Dr. Henryk Beins (Holland). Patented method of liquefying carbonic gas.

- 1878 Putnam patented a swing-type bottle stopper; later known as "Lightning" stopper.

Matthews invented solid-plunger syrup pump which, with modifications, became popular with bottlers of soda water.

- 1879 Dr. W. Raydt (Germany). Made improvements in apparatus for compressing carbon dioxide to liquid form.

Charles G. Hutchinson (Chicago). Patented a spring type of internal stopper; became widely known as "Hutchinson" stopper.

Spindle type brush washer for bottles patented; advertised as "Lightning" Bottle Washer.

1880-1890

U.S. population 50,156,000 (1880).

States admitted: North Dakota, South Dakota, Montana and Washington (1889). Opening of Oklahoma territory (1889).

Gold resumption prosperity (1879-1883); depression (1884-1886); railroad prosperity (1886-1889).

American National Red Cross (1881); Labor Day (1882); Northern Pacific Railroad to west coast (1883); linotype (1884); electric motors for power uses (1884-6); long distance telephone (1885); American Federation of Labor (1886); beet sugar (1887); Interstate Commerce Commission (1887); first electric street railways—Cleveland (1884).

- 1880 Census reported 512 plants for making bottled soda water in operation in the United States; capital \$2,570,000; value of production \$4,750,000; 159 plants located in 15 principal cities; 27 in New York City, 21 in Brooklyn.
Vernor's ginger ale made by James Vernor in Detroit.

- 1881 American Carbonator and American Bottler. Started as trade publication by W. A. Peters, New York City; discontinued 1906.

Clicquot Club Company began manufacture of ginger ale and other beverages at Millis, Mass.

- 1881 John Matthews granted first of series of patents on filling portable fountains with soda water; formed basis of so-called "new system."
- 1882 National Bottlers' Gazette. Started as trade publication, by William B. Keller, publisher and editor, New York City. United States Bottlers' Protective Association organized as national association, at meeting in Pittsburgh; included first industry exhibit.
- 1883 White Rock mineral waters bottled at Waukesha, Wis. Raydt's liquid gas used in mineral water factory in Berlin, Germany; followed by opening of factory for its commercial production.
- 1884 First liquid carbonic gas commercially used in the United States is imported from Germany, by Bruennler. Roger F. Scannell (Boston). Granted first U. S. patent on the spray carbonator. Early "Hires" root beer ads appear in media of national circulation; Harper's Weekly and Harper's Monthly Magazine.
- 1885 William Painter (Baltimore). Patented single-use "Bottle Seal"; The Bottle Seal Company organized. "Moxie" bottled and shipped by Moxie Nerve Food Company, Boston, Mass. R. S. Lazenby (Waco, Texas). Perfected "Dr. Pepper" flavor; fountain operation; name adopted as brand a few years later.
- 1886 German attempt to introduce liquid carbon dioxide in the soda water trade in U. S. continued; not successful. Harry Robertson (New York). Granted patent on improvement in carbonator; spray type; marketed by Witteman. Early drum-type bottle washing machine on the market; named "Triumph"; U. S. patent issued to Wm. W. Horner, of England. Dr. John S. Pemberton (Atlanta). Coca-Cola first produced and marketed in Atlanta by its originator.
- 1888 Liquid Carbonic Acid Manufacturing Company organized by Jacob Baur and associates, in Chicago; commercial manufacture of liquid gas begun in 1889. Asa G. Candler (Atlanta). Acquired majority interest in Coca-Cola.

- 1888 Dr. Pepper bottled at Waco, Texas, by Artesian Manufacturing and Bottling Co. Carbonated Beverages bottled by John J. McLaughlin, in Toronto, Canada; later became Canada Dry (1906).
- 1889 Slogan "Delicious and Refreshing" used for Coca-Cola; total syrup sales almost 9,000 gallons in 1890. American Bottlers Protective Association is organized at Philadelphia meeting; superseded U.S.B.P.A. Cloverdale beverages bottled at the spring, Newville, Pa.

1890-1900

U.S. population 62,948,000 (1890).

States admitted: Idaho and Wyoming (1890), Utah (1896). Annexation of Hawaii. Cuba, Puerto Rico, and Philippines acquired by treaty; Cuban independence (1900).

Railroad prosperity (1890-1893); Panic of 1893; general financial depression (1893-1895); Silver Campaign depression (1896-1897); Spanish-American War (1898).

Sherman Anti-Trust Act (1890); Sugar duty-free (1890, reimposed 1894); great railroad and coal strikes (1892, 1894); color printing (1892); World's Fair Columbian Exposition, Chicago (1893); second Federal income tax (1894); electric railways (1895); first automobiles manufactured (1896); first U.S. submarine (1897); first delivery by motor truck (1899); first wireless on U.S. vessel (1899).

- 1890 Census reported 1377 plants for making bottled soda water in operation in the United States; capital \$10,782,000; sales \$14,354,000; 609 plants in 77 cities of over 20,000 population; 89 in New York City, 56 in Brooklyn. Soda water trade beginnings on West Coast; San Francisco had 15 bottling plants; Los Angeles 3. Tank sales of carbonated water to fountains represented a substantial part of the bottler's business. Dr. Swett's Root Beer introduced. New types of power-operated bottle washing machines marketed in this decade; included "Hamann's Bottle Washer" and the "Eick Bottle Cleansing Machine." Power-operated gas generators supersede hand-operated types in soda water plants. New types of carbonators (Cataract, Eureka, Washington, Niagara, Magic) also were introduced in this period. William Painter (Baltimore). Issued patent on a foot-operated soda machine to use the "Bottle Seal."
- 1891 American Soda Fountain Company organized; combined the businesses of Matthews, Lippincott, Tufts, and Puffer.

- 1892 William Painter (Baltimore). Granted U. S. patent on the crown closure; invented 1889; Crown Cork and Seal Company organized as successor to The Bottle Seal Company.
Foot-operated soda machine (syruper-crowner) to use crown closure, also patented by Painter.
Haart Manufacturing Company. Manufactured carbonators under patents of Henry Carse.
The Coca-Cola Company incorporated as Georgia corporation; authorized capital stock \$100,000.
- 1893 Liquid Carbonic Acid Mfg. Co. introduced "Niagara" carbonator and pump; one of first automatic carbonators. World's Fair Columbian Exposition (Chicago). Soft drink concession awarded to Charles Lippincott & Co., of Philadelphia (\$150,000).
Hires Root Beer bottled in Philadelphia, by Crystal Bottling Company; also offered to other bottlers.
- 1894 First bottling of Coca-Cola begun by Joseph A. Biedenharn of Vicksburg, Miss.; sales confined to local area.
- 1895 Michael J. Owens (Toledo). Patented machine for blowing glass bottles; semi-automatic.
Rights to "Dr. Pepper" for fountains vested in firm later known as first Dr. Pepper Co. (until 1907).
- 1896 Caleb D. Bradham (New Bern, N. C.). Developed formula for "Brad's Drink"; later called "Pepsi-Cola" (1901) and franchised to other bottlers.
- 1897 Liquid Carbonic Acid Manufacturing Co. began manufacturing soda fountains.
Herbert S. Elworthy. Granted U. S. patent on the manufacture and use of solid carbon dioxide.
Crown closures in production five years; sales this year 657,600 gross.
- 1898 Single-head power-operated machines for the Bottle Seal and crown are marketed by Crown Cork and Seal Company; also first multiple head power crown machine, rotary, with automatic crown feed.
First Federal excise tax on soda water is proposed, as war measure; not enacted.

- 1899 William Painter patents on automatic crown feed for bottling machines.

Benjamin F. Thomas and Joseph B. Whitehead granted bottling rights by The Coca-Cola Company to bottle and sell Coca-Cola in most of continental United States; first plant in Chattanooga (1899), second in Atlanta (1900).

1900-1910

U.S. population 75,955,000 (1900); 8,795,386 immigrants (1900-1910). Oklahoma admitted (1907).

Merger prosperity (1900-1903); business distress (1903-1904); corporate prosperity (1905-1907); Panic of 1907 (1907-1909).

Pan-American Exposition, Buffalo (1901); chlorine (1901); U.S. Steel Corporation (1901); selling liquor on military reservations prohibited by Congress (1901); trans-Atlantic wireless (1903); first airplane (1903); Louisiana Purchase Exposition, St. Louis (1904); Federal Food & Drug Act (1906); General Motors Corporation (1908); 26 million horses in U.S., less than 200,000 autos and trucks (1908).

Mechanical (1900-1905):

Introduction of new type carbonators continued; involved cascade or spray principle combined with paddle agitators; power-operated.

Early chain-type bottle soakers are introduced, multiple and single compartments; spindle brush washers and rinsers separate; all power-operated.

- 1900 Census reports 2,763 bottling plants operating; annual sales \$23,269,000; capital \$19,727,000.

Twentieth Century Machinery Company (Chicago). Specializing in bottle soakers.

Loew Supply & Mfg. Co. (Cleveland) manufactured Cleveland bottle cleaner.

- 1901 Advertising budget of the Coca-Cola Company for this year reached \$100,000.

- 1902 Name of Liquid Carbonic Acid Manufacturing Co. changed to the Liquid Carbonic Company.

Barry-Wehmiller Machinery Co. (St. Louis) in bottle washing equipment field; multiple compartment soakers. Coca-Cola in bottles featured in newspaper advertising for the first time.

- 1903 Michael J. Owens (Toledo). Invents automatic machine for blowing glass bottles; patented 1904.

Caleb D. Bradham forms Pepsi-Cola Co., New Bern, N. C.

- 1904 George J. Meyer Machinery Co. (Milwaukee). Began manufacture of Simplex bottle soakers: later George J. Meyer Manufacturing Co.
Sales of Coca-Cola syrup reach 1 million gallons annually; Company begins integrated advertising program in general magazines; number of authorized bottlers 123.

Mechanical (1905-1910):

Early types of gravity conveyor system (rollers) developed, with bottling plants among first users; later power-operated.

Bottle washers using pressure for cleansing introduced; hydro type. Automatic brushing mechanism for bottle exterior cleaning, for use with soakers; known as "brush conveyor"; preliminary type of automatic bottle feed for soaker (1907).

Semi-automatic fillers (syruper-filler-crowner) introduced, power-operated; hand feed (1907-1910).

- 1905 Line of new carbonators introduced by Liquid Carbonic Company during years 1894-1905.
"Southern Carbonator and Bottler" trade magazine started by Donald A. Loyless, Atlanta, Ga. (later American Soft Drink Journal, 1955).
National Manufacturers of Soda Water Flavors, organization of flavor makers.
Two new drinks—Iron Brew, and Iron Beer.
- 1906 Ladewig & Stock Co. (Waukesha) manufactured Ladewig Hydropneumatic bottle washer; later the Ladewig Company (1918).
Shields Automatic Bottling Table Co. in the equipment field.
The American Bottler published as official organ of the American Bottlers Protective Association (disc. 1924).
Southern drinks—Buffalo Rock ginger ale, and Barq's root beer.
- 1907 Clicquot Club ginger ale being advertised in 25 national magazines.
Machine-made beverage bottles first placed on the market; made by the Owens machine; American Bottle Company.
- 1908 Barry-Wehmiller single-compartment soaker for the small bottling plant.

1910-1920

U.S. population 91,972,000 (1910); 5,735,811 immigrants (1910-1920).
New Mexico and Arizona admitted (1912).

Unsettled period (1910-1913); War begins in Europe (1914); war depression (1914-1915); war prosperity (1915-1920); U.S. enters the war (1917); World War I ends (1918).

Postal Savings System (1910); Chamber of Commerce of the U.S. (1912); Parcel Post system (1912); Department of Commerce (1913); Panama Canal opens (1914); 136,000 motor trucks in U.S. (1915); Panama-Pacific Exposition, San Francisco (1915); music termed "Jazz" (1916); anti-liquor legislation by Congress, Prohibition Amendment proposed (1917); influenza epidemic (1918); air-mail started (1918); Radio Corporation of America (1919).

Mechanical (1910-1915):

Low-pressure tangential fillers are introduced, combining syruper unit and filler unit on a single base; crowner unit separate (1913).

Improved models of larger bottle soakers manufactured (1910); special combinations of compartmented soaker units provided for washing capacity up to 3,000 bottles per hour.

Automatic machine for brushing bottles on inside and rinsing; chain type (1911).

Automatic feed and discharge on bottle soakers-washers become standard equipment (1913-1914).

Belt bottle conveyors manufactured; also used in automatic bottle feed for fillers and crowners (1912-1914).

Improvements in semi-automatic labeling machines; principally hand feed.

Platform lift trucks (manual; electric) introduced.

- 1910 Census reports 4,916 bottling plants operating; annual sales \$43,508,000; capital \$42,305,000.
Senior and Junior filler-crowners; power-operated; Crown Cork & Seal Company (1907-1910).
- 1911 The Irwin carbonator is advertised.
- 1912 Manufacture of "Hutchinson" stopper discontinued.
Chero Cola Company organized by Claude A. Hatcher, Columbus, Ga.
Charles E. McManus (New York City). Perfected composition cork disc for crown closures; organized New Process Cork Company.

- 1913 First low-pressure rotary syruper-filler; made by Liquid Carbonic Company.
Miller Manufacturing Company began bottle washer manufacture: later Miller Hydro Company.
Beginning of major transition from use of horse-drawn delivery wagons to the motor truck; popular models White, Autocar, International Harvester.
Popular new drinks—Orange Smile, Cherry Blossoms, Orange Julep, Grape Julep, Cherry Julep, Cherry Smash.
- 1914 Coca-Cola Bottlers' Association organized (Atlanta).
Mechanical (1915-1920):
Early models of soaking and brushing mechanisms combined in unitary bottle washing machine, automatic feed and discharge (1915).
Single-end (feed and discharge) bottle soaker-washers introduced (1915-1918); double-end (front load, rear discharge) previously prevailed.
Metallic flat top chain replaces canvas belt for bottle conveyor (1915).
World War I period; mechanical development retarded.
- 1915 Initial design of Coca-Cola bottle patented by Alexander Samuelson (Root Glass Co., assignee).
Cloudy type orange drinks appear on market. Delaware Punch introduced.
- 1916 Michael Yundt Company (Milwaukee) began manufacture of bottle washing equipment about this time.
Orange Crush introduced as franchised bottled drink. Also Whistle.
- 1917 Dumore machinery line of Meyer Mfg. Co. included single-end bottle washer.
- 1918 National Bottlers Association organized; superseding American Bottlers Protective Association.
Lime drinks prominent; Green River, and Lime Cola.
- 1919 Federal excise tax of 10% placed on soft drinks, effective February, 1919, as war measure.
The Coca-Cola Company sold by Candler interests for \$25,000,000; reincorporated as Delaware corporation; stock put on public sale \$40 per share.

- 1919 Pacific Bottler begins as trade publication (currently the Western Bottler).

American Bottlers of Carbonated Beverages organized as national association of the industry; superseding National Bottlers Association.

1920-1930

Mechanical (1920-1925):

U.S. population 105,711,000 (1920); limitations on immigration (1921).
Postwar depression (1920-1922); period of prosperity (1922-1929); stock market collapse (1929); Federal revenues \$4 billion, expenditures \$3.3 billion (1929).

84 companies made 2 million autos and trucks (1920); first radio broadcast (1920); Prohibition Amendment in effect (1920); vitamins in advertising (1921); daily radio broadcasts in New York City (1922); agitation for prohibition repeal (1923); 4,325,000 autos manufactured (1924); trans-Atlantic wireless telephone service (1925); Ford starts 5-day week (1926); talking pictures, "The Jazz Singer" (1927); sliced bread marketed (1929); "ginger jake" incidents (1930).

Improved types of automatic and semi-automatic filling machines, high pressure, are introduced; hand feed (1920).

Conveyor bottle feed available for automatic (1922).

Crowner becomes unitary part of rotary type low-pressure filler (1924).

Early type case dump and bottle feeder attachment developed for bottle washer (1924).

Rotary accumulating tables added to filling line.

Deaerator developed to prepare water for carbonation (1921); later included in carbonators.

Improvements in labeling machines, semi-automatic (hand feed); also automatics; rotary and multiple bottle "in line" types appear.

Early form of ozone water treatment; also product inspection devices (visual).

Improvements in syrup equipment include wide use of glass-lined metal tanks; mechanical mixers, separately and in combination with tanks; mechanical syrup filters (cloth, paper, asbestos); syrup pumps.

- 1920 Census reports 5,194 bottling plants operating; annual sales \$135,341,000; capital \$102,839,000.

Dixie Automatic and Baltimore Semi-automatic machines introduced by Crown Cork & Seal Co.

Shields, Adriance, Calleson fillers used in early 1920's.

- 1920 Prohibition Amendment effective January 29 1920.
Transition to crown and crown-finish bottle completed.
C. L. Grigg (St. Louis). Organized the Howdy Company.
- 1921 A.B.C.B. starts annual exposition under association auspices, as means of encouraging industry progress.
Federal 10% tax on soft drinks changed to tax on syrup and carbonic gas.
NuGrape Company of America organized in Atlanta; O. R. Randall management.
- 1922 Dry ginger ale enters the American market; is widely advertised and promoted as "mixer"; Canada Dry opens New York plant.
Dr. Pepper activity moved to Dallas, Texas; acquired by Circle A Company.
Grape drinks popular—NuGrape, Good Grape, Grapico, Bluebird; also Nuicy, Brandimist, and Brandywine.
New drinks—Orange Kist, and Ginger-Mint Julep.
Six-bottle carton for Coca-Cola first manufactured.
- 1923 Research Fellowship started at Iowa State College by A.B.C.B.
Automatic labelers in use; included Ermold, World, O. & J. Canada Dry purchased from J. J. McLaughlin, Ltd. of Canada by P. D. Saylor and associates, for \$1,000,000; operated as Canada Dry Ginger Ale, Inc.
- 1924 Nehi line of flavored drinks started by Chero Cola Company; Nehi Corporation organized soon thereafter.
8 oz. and 10 oz. bottles are introduced by entrants into franchise beverage field; several new franchise drinks are introduced; Nesbitt's Orange.
Dr. Pepper Company organized at Dallas, Texas.
Rapid improvements in beverage coolers for use in retail outlets; first all-metal coolers manufactured.
Wartime Federal taxes on soft drinks repealed.

Mechanical (1925-1930):

Improvements in water treatment; activated carbon filters; continuous system of lime-alum-chlorine treatment developed.
Early models gas operated fork-lift trucks developed.

- 1925 Designed bottles for branded soft drinks become popular during 1920-1930 period; many styles patented.
First Clicquot Club radio advertising program; first radio trademark overture; "Clicquot Club Eskimos".
Early forms of automatic soft drink vending; Sodamat; cups; single flavors.
State tax on soft drinks enacted in S. C.; 1¢ per bottle.
- 1926 Cooperative national advertising program initiated by A.B.C.B.; \$900,000 subscribed; concluded 1929.
Bottling franchises offered by Dr. Pepper; company under J. B. O'Hara management.
Vess dry ginger ale franchised.
Name of the Liquid Carbonic Company changed to The Liquid Carbonic Corporation.
- 1927 Liquid sugar manufactured for industrial uses; used in soft drink manufacture in limited way; increased after World War II.
Crown Cork & Seal Co. merged with New Process Cork Company; Charles E. McManus, President.
Liquid Carbonic Corp. absorbed Loew Manufacturing Co. Refined Syrups & Sugars, Inc. (Brooklyn) opens first plant for commercial manufacture of liquid sugar.
- 1928 Carry-home carton (6 bottles) widely introduced as soft drink merchandising feature.
Seven-Up introduced by C. L. Grigg, founder of the Howdy Company, St. Louis, Mo.
Meyer Mfg. Co. enters filling equipment field.
Industry produces more than 250 million cases per year for first time; value \$200 million; per capita 50 bottles.
- 1929 Voluntary Sanitary Code for industry promulgated by A.B.C.B.
Slogan "The Pause That Refreshes" first used in advertising by Coca-Cola.
Industry reaches pre-depression peak in annual sales; 272,429,000 cases; not to be reached again until 1936.

1930-1940

U.S. population 122,775,000 (1930)

Secondary postwar depression (1930-1940); banks closed (1933); 14-17 million unemployed (1933-1936); World War II begins in Europe (1939).

First State retail sales tax (Kentucky) (1930); Empire State Building (1931); Federal insurance on bank deposits (1933); 3.2% beer (1933); U.S. off gold standard (1933); Century of Progress Exposition, Chicago (1933-4); beer in cans (1934); sugar controls under Jones-Costigan Act (1934); N.R.A. held unconstitutional (1935); Social Security Act (1935); W.P.A. established (1935); rayon cord (1937); wave of sit-down strikes (1937); Federal Wage-Hour law (1938); new Federal Food, Drug and Cosmetic Act (1938); first commercial television, NYC (1939); Golden Gate International Exposition, San Francisco (1939); World's Fair, New York City (1939).

Mechanical (1930-1935):

Trend to higher speed fillers.

New types of carbonators introduced; spray tower eliminated in some; film flow and recirculating types of carbonators appear.

Stainless steel for syrup tanks, pipelines, and other uses in bottling plant.

Converter units for use of solid carbonic gas (1932).

1930 Industry reports 7,646 bottling plants operating; estimated annual sales \$207,815,000; approximate equivalent 252,571,000 cases.

Red Diamond rotary fillers introduced by Liquid Carbonic Corporation.

Service laboratory for assistance of members is started at A.B.C.B. headquarters in Washington.

Era of chocolate drinks; included Chocolate Soldier, Mavis, Choc-au-lait, Brownie, Chocolate Mello, Kayo, Kremko.

Bireley's Orange drink introduced.

Charles G. Guth and Loft, Inc. associates purchase bankrupt Pepsi-Cola Company; reported price \$12,000.

Early automatic vendors for bottled drinks; Tavernette model (Chicago).

1932 Federal soft drink taxes of World War I revived as depression revenue measure; repealed in 1934.

Solid carbon dioxide for bottling plant use by Dry Ice Corporation; converters by Rudd Brothers.

1933 Newer brands included—Ju'Cy Orange, Par-T-Pak, Upper 10, Mission Orange.

1934 N.R.A. Code of Fair Competition for Bottled Soft Drink Industry promulgated; Code Authority organized.

Bottling of Pepsi-Cola under franchises; 12 oz. bottles used.

Use of 12 oz. bottle increases, as competitive factor; "Applied Color Label" is used on soft drink bottles for first time; style of 6-bottle carton is redesigned to open type.

Mechanical (1935-1940):

Tumbler-type beverage mixers replace hand operation on filling line (1935).

Combined cooling (syrup-water) and carbonating units introduced, as aid to higher filling speed (1937).

New models low-pressure fillers introduced; capacities rated 200-300 bottles per minute.

New model carbonators increase capacity to 1600 gallons per hour.

Early types of case packers manufactured (1937).

New system of filling blends syrup and water before cooling and carbonating (pre-mix) for bottling (1939).

Increased use of stainless steel in plant equipment.

Liquid carbonic gas distributed in bulk for bottling plant use; low pressure; special vehicles for transporting; temperature control units for use in bottling plants (1939).

Newer types water treatment include chlorinating units, ultra-violet ray, ozone sterilizer, and hydrogen-ion exchange method; use later declined.

1935 National Industrial Recovery Act held unconstitutional; Code activities terminated.

Royal Crown Cola introduced by Nehi Corporation.

1936 Milk plants enter the bottled soft drink field with "dairy orange" flavored drink; bottled "still" orange drinks also introduced.

Clicquot Club experiments with cans for ginger ale, abandoned after one year.

100 automatic soft drink vendors reported in Chicago area; cups; single flavors.

Charles E. Hires Company operations expand; branch plants established in several cities; 12 oz. bottles used.

- 1936 Other drinks recently introduced included Double Cola, Try Me, Big Bill, Big Boy, 2-Way, Pick Upper. 12-bottle carry home carton introduced in some areas. State tax on soft drinks in Kentucky; repealed 1937. A.B.C.B. puts mobile field laboratory into service, for members' assistance. Pre-depression sales level is regained by industry; production-sales 293,222,000 cases, value \$229,800,000.
- 1937 Use of automatic venders for bottled soft drinks appears; Mills, Vendo units. The Seven-Up Company organized as successor to Howdy Company, St. Louis, Mo. Majonnier Bros. Company introduces combination water cooling-carbonating unit; Carbo-Cooler. Root beer prominent; newer brands included Twang, Howell's, Dad's Old Fashioned, Triple XXX. Coca-Cola syrup sales reach 40 million gallons.
- 1938 New Federal Food, Drug and Cosmetic Act enacted: also Fair Labor Standards Act. New drinks included Squirt, Fruit Bowl, Tru-Ade, Sun-crest Orange, Sun Spot, Lucky Club. National shippers of ginger ale announce plans to supply products locally by franchised bottlers or area plants. Sky-writing advertising begun by Pepsi-Cola.
- 1939 The 12 oz. bottle about 25% of industry production. 70,000,000 carry-home cartons are used by bottlers of Coca-Cola. Multi-flavor automatic vendors for soft drinks; cups. Pepsi-Cola advertising in magazines is started; cartoon type ads; jingle commercial used in radio broadcasting. Meyer "Syncromix" system of filling introduced.

1940-1950

U.S. population 131,669,000 (1940)

Federal Revenues \$5.9 billion, expenditures \$9 billion, national debt \$42.9 billion (1940); U.S. enters World War II after Pearl Harbor (1941); high production levels and war expenditures (1941-1945); postwar boom (1946-1949); 1949 recession; prices and wages increase rapidly after controls ended (1946-1947). VE Day (May 6, 1945); VJ Day (August 14, 1945).

Selective Service Act (1940); First American jet plane (1942); Rationing as war measure (1942); U.S. seizes railroads to bar strike (1942); Atomic bomb at Hiroshima (1945); Yankee baseball team sold for \$3 million (1945); United Nations Charter (1945); Philippine independence (1946); UMW soft coal strike (1946); Wartime controls ended (1947); Hughes flies world's largest plane, capacity 500 (1947); displaced persons admitted to U.S. (1948); Jet B-47 crosses U.S. in 3 hrs., 46 min., B-50 Super-fortress circles globe nonstop (1949); U. N. Headquarters in New York City (1949).

Mechanical (1940-1945):

- Spinner type beverage mixer units introduced early in this period (1940). Lime-alum system of water treatment combined in single unit; ferrous sulfate used to replace alum with most water supplies (1940). World War II restrictions and materials shortages.
- 1940 Industry reports 6,118 bottling plants operating; estimated annual sales \$411,699,200; approximate equivalent 550,400,000 cases; exceeds half billion cases for first time; per capita consumption reaches 100 bottles. Grapette enters the franchise drink field. Old fashioned root beers prominent; included Ma's, and Frostie.
- 1941 Wartime shortages and other operating difficulties appear; cork, tin, paperboard, building materials, sugar. Industry threatened with Federal taxes on soft drinks as wartime revenue measure; also in 1942, 1943; not enacted. Last pre-war industry exposition (Philadelphia).
- 1942 Industry Advisory Committee organized to assist War Production Board. Numerous wartime restrictions placed on materials, supplies, transportation, employment, etc.; prices frozen, sugar rationing restricts production. Government prohibits annual exhibits; wartime measure; resumed in 1947. Wide use of abbreviated trademark "Coke" for Coca-Cola.
- 1943 Seven-Up advertising in national media.

Mechanical (1945-1950):

New models of carbonators increase productive capacity to 2,000 gallons per hour. Electronic type product inspection device manufactured for bottling plant use (1946).

Mechanical (1945-1950), continued:

Bottle unscrambler and feeder table for washer units (1948); combination of uncaser and unscrambler. Liquid carbonic gas (high-pressure) distributed in bulk for bottling plant use; piped to cylinder storage (1949). New types accessory devices include case and carton packers; case feeders for packers; syrup cooling units. Availability of liquid sugar requires storage facilities in bottling plants.

Mechanical lift-trucks, for pallet handling of bottles and cases in plants (storage, truck loading, and unloading) widely used; gas and electric operated. Truck bodies changed for pallet loading. Automatic pallet loaders.

- 1945 Chesterman Award program announced by A.B.C.B. to recognize current contributions to scientific progress of the industry.

Pepsi-Cola Company introduces Evervess club soda.

A.B.C.B. starts program of annual Plant Training Courses.

Revocation of most wartime restrictions follows VE and VJ Days (sugar, prices excepted); Industry Advisory Committee dissolved.

- 1946 Control of soft drink prices revoked (Oct. 23). Automatic vending machines for bottled soft drinks increase in use following wartime period; post-mix cup machines, also.

More than 1,000 new soft drink bottling plants opened during the three-year period beginning in 1946.

Radio Corp. of America; electric-eye device for inspecting finished product introduced.

New trade publications enter industry; Bottling Industry and Mid-Continent Bottler.

Pepsi-Cola Bottlers' Association organized (Chicago).

- 1947 Sugar rationing terminated (July 28).

Ladewig washer; simplified type double-end soaker washer, introduced by Archie Ladewig Co., Waukesha, Wis. Mason's root beer.

State tax on soft drinks enacted in Pennsylvania; discontinued in 1951.

Annual industry exposition resumed (Atlantic City).

- 1948 Sugar Act of 1948 enacted; to control levels of sugar production and supply.

Nonreturnable soft drink bottles offered to the industry by bottle manufacturers.

Industry's production-sales exceed 1 billion cases for first time; per capita 164 bottles.

1950-1957

U.S. population 150,697,000 (1950); 170,000,000 (1957).

Korean conflict (1950); general business prosperity, higher prices-wages (1950-1957); cost-of-living index 192.3% of 1935-9 av. (1955); Federal revenues reach \$78.8 billion, expenditures \$66.5 billion—national debt \$272.7 billion (1956).

American jet planes in Korea (1950); 1,337,154 motor trucks in U.S. (1950); 105 million tons of steel manufactured (1951); 10,694 newspapers in U.S. (1951); Federal wage-price controls reimposed (1951); Midwest floods, damage over \$1 billion (1951); Transcontinental TV (1951); 100 million radios in 42 million homes, (1952); 3,046 radio stations in U.S. (1952); sales taxes levied in 34 states (1952); H-bomb tested at Eniwetok (1952); steel strike (1952); first atomic submarine, Nautilus (1954); segregation issue (1954); 9,130,000 autos and trucks manufactured (1955); AFL-CIO merger (1955); first trans-Atlantic telephone cable (1956); first civilian atomic power plant (1957); successful U.S. ballistic missile tests (1957); satellites in orbit (1957-1958).

Mechanical (1950-1957):

New models of filling equipment with rated filling capacities 400-450 bottles per minute.

Equipment for dispensing pre-mixed carbonated beverages in bulk introduced; includes product tanks, tank washers, tank filling devices. Retail vending machines for pre-mix product also introduced (1954).

New types accessory devices include: case cleaners; new types casers; uncasers; carton setup units; palletizers. Systems developed for unloading bulk sugar from vehicles and for conveying to storage bins in bottling plants; portable bins used in serving small plants with bulk sugar.

- 1950 Industry reports 6,662 bottling plants operating; estimated annual sales \$876,532,600; approximate equivalent 1,001,751,500 cases.

- 1951 Wage-price freeze announced by Government, anti-inflation measure as incident of Korean conflict; created serious economic difficulties for the industry. State tax on soft drinks enacted in West Virginia; 1¢ per 16 oz. or less, plus 1¢ general sales tax.

- 1952 Control of soft drink prices terminated. 600,000 automatic vendors for bottled drinks reported

- on location; estimated annual distribution 5 billion bottles; also 38,000 cup machines vending 1.2 billion drinks.
- 1952 Liquid Carbonic Corporation discontinued manufacture of soda fountain equipment.
Value of industry's annual production exceeds 1 billion dollars for first time.
- 1953 Remaining emergency controls revoked. Upward trend in soft drink prices begins.
Bottled beverages, with synthetic sweeteners, are widely introduced for diabetic and special dietary uses. Prominent brands included No-Cal, Diet Rite, Cott's.
Cans are widely promoted as containers for carbonated soft drinks; Can-A-Pop, Super-Coola, Shasta, Tap-A-Cola, and other brands in cans. Schweppe's in America.
Pepsi-Cola advertised "The Light Refreshment."
Society of Soft Drink Technologists organized.
- 1954 Vending machines for dispensing premixed beverages introduced; tanks filled at bottling plants.
Nehi canned beverages; canning plants 6 areas.
18 million cases of canned soft drink are produced; numerous brands in cans; decline in succeeding years.
- 1955 The 8-bottle home carton on the market; use limited.
Liquid Carbonic Corporation discontinues manufacture of bottling plant equipment.
New drinks included—Quiky, Sprig, Uptown, Get Up.
10 oz., 12 oz., 26 oz. bottles for Coca-Cola in some areas.
- 1956 Forty brands of soft drinks in cans reported.
Coca-Cola, Pepsi-Cola, Canada Dry, Nehi, Hires, in cans for overseas shipments.
Shallow crowns (short skirt) are introduced.
Display of bottling plant equipment of 1890's featured at A.B.C.B. Convention-Exposition (Cleveland).
- 1957 Industry's use of 6-bottle carton estimated to exceed 700 million per year.
Total investment in American soft drink industry approximates \$2,000,000,000, including bottlers, proprietary drink companies, and other direct interests.
Annual production estimated in excess of 1,360,000,000 cases; valued over \$1,347,000,000.

APPENDIX

A Selection of Statistical Data Showing Development of the Bottled Carbonated Beverage Industry in America, and Its Status at Mid-Century.

A List of Prominent Franchise Brands of Bottled Carbonated Beverages, and the Proprietary Manufacturers of Such Brands.

A List of Well-known Bottling Companies During the 1920's, Engaged Primarily in Producing Private Brands of Bottled Soft Drinks.

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